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MONTEREY, CALIFORNIA

THESIS

**ANALYSIS OF THE RETENTION AND AFFILIATION
FACTORS AFFECTING THE ACTIVE AND RESERVE
NAVAL NURSE CORPS**

by

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March 2007

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**ANALYSIS OF THE RETENTION AND AFFILIATION FACTORS AFFECTING
THE ACTIVE AND RESERVE NAVAL NURSE CORPS**

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This thesis assesses the factors affecting retention rates in the active Naval Nurse Corps and affiliation rates with the reserves among those who left active duty services. The thesis is composed of two parts: (1) an organizational analysis of the Navy Nurse Corps utilizing the Organizational System Framework and the Organizational Configurations model; (2) an empirical analysis to analyze characteristics of those who are retained in the active Naval Nurse Corps and those who affiliate with the reserve Naval Nurse Corps using multivariate logit regressions. Cohort data files were compiled from the Defense Manpower Data Center and the Bureau of Medical Information Systems. We analyzed three groups of factors: demographics, professional characteristics, and military experience. Factors associated with positive retention rates include being a male, a minority, having dependents, being prior enlisted, having a subspecialty beyond general nursing, and having a postgraduate degree. The best accession sources were the Medical Enlisted Commissioning Program and Direct accession. Factors associated with positive reserve affiliation rates include being prior enlisted and having a subspecialty beyond general nursing. Our major recommendations for the Navy include shifting focus from accession bonuses to retention bonuses and increasing Medical Enlisted Commissioning Program accessions.

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I. INTRODUCTION

A. PURPOSE

This thesis examines multiple decision points for active members of the United States Naval Nurse Corps (NNC). The first decision point that will be analyzed is the decision to stay on active service or leave. The second decision assessed is the decision to affiliate with the Selected Reserve or leave military service.

The NNC is an organization that is comprised of 3064 active nursing Billets Authorized (BA) and 1335 reserve nursing BA. Currently, the NNC is at its lowest end strength in the past 13 years.¹ The number of nurses in the Nurse Corps has dropped so dramatically that efforts put toward recruiting and retaining general nurses is no longer enough to cover the specific skill sets required in the Navy. In the past 3 years, the Nurse Corps has not been able to fill their BA. In 2005, the NNC had a net loss of 104 nurses. In 2006, they had a net loss of 103 nurses. In 2007, the NNC plans to lose another 270 nurses – almost another nine percent of the total BA for the NNC!² Additionally, the NNC's accessions are capped at 250 nurses per year. This means that, at the least, the NNC stands to have a net loss of twenty nurses in 2007.³

A major factor that has affected the ability of the NNC to recruit and retain nurses is the civilian nursing shortage that has been steeply increasing since the early 1990's. The NNC has monitored the growing deficit closely and has focused their efforts on the recruiting and retention of nurses within the Navy by doing such things as forming retention teams and midlevel leadership development workgroups.⁴ This purpose of this thesis is to assist the NNC in identifying characteristics of NNC officers who stay Active Duty and who affiliate with the Reserves. The thesis will also analyze the NNC system as

¹ G. Zangaros. *Data Analysis of Retention Factors*.
<https://wwwa.nko.navy.mil/portal/page?paId=page11924> (Accessed Dec 2005).

² V. Morrison. *Nurse Corps Specialty Report as of December 2006*, Excel Spreadsheet emailed Jan 2007.

³ Ibid.

⁴ Ibid.

a whole. The quantitative and qualitative analyses will be combined to make recommendations that will fit in the NNC's organization and help stem the tide of nurses leaving the Nurse Corps.

B. BACKGROUND

The number of nurse billets authorized in the Navy has grown steadily to a maximum of 3200 billets in 2001. However, in 2001 there was an assessment completed on the needs of the Navy and Planning and Budget Decision (PBD) -712 was enacted to decrease the number of nursing billets authorized by 89 billets.⁵ This was the first time in Navy nursing that there was a permanent reduction in funded billets. The distribution of billets authorized and current manning is depicted in Table 1 for the active NNC and Table 2 for the reserve NNC. Included in these tables are the subspecialty categories used for the regressions to follow.

⁵ Department of Defense, *Program Budget Decision 712: Military to Civilian Conversion*, Washington, Dec 2003.

Table 1. Active NNC Billets Authorized by Subspecialty (from V. Morrison. *Nurse Corps Specialty Report as of January 2007*, Excel Spreadsheet emailed Feb 2007.)

M1C1 NURSE CORPS (DESIG 29XX) SPECIALTY REPORT AS OF 31 JANUARY 2007											
Identifier for subspecialty codes in the regression model	SUBSP CODE	SUBSPECIALTY DESCRIPTION	INVENTORY	+	2XXX	-	III TRAINING	=	NET INVENTORY	DELTA	% MAINTAINED
	3130	MPTA	15		2		4		13	(2)	87%
Administration	3150	E & T Management	26		4		2		28	(3)	90%
Administration	1806	Healthcare Manag	7		0		2		5	(1)	83%
Administration	1900	Professional Nursing	815		27		4		838	(36)	96%
General Nurse	1901	Nursing Adm	19		0		2		17	(40)	30%
Administration	1903	Nursing Ed	24		1		2		23	(16)	59%
Administration	1910	Med/Sug	517		0		16		501	39	108%
Medical/Surgical	1920	Maternal Infant	195		0		3		192	50	135%
Obstetrics/Pediatrics	1922	Pediatric Nursing	40		0		1		39	(5)	89%
Obstetrics/Pediatrics	1930	Psychiatric Nursing	63		0		6		57	6	112%
Psychiatric Nursing	1940	Community Health	27		0		6		21	(23)	48%
Obstetrics/Pediatrics	1945	ER/Trauma Nursing	177		0		10		167	2	101%
Emergency Room	1950	Perioperative Nursing	257		0		8		249	(36)	87%
Operating Room	1960	Critical Care Nursing	201		0		14		187	(152)	55%
Critical care/Intensive Care Unit	1964	NICU Nursing	26		0		2		24	(5)	83%
Critical care/Intensive Care Unit	1972	Nurse Anesthesia	177		0		57		120	(16)	88%
Certified Registered Nurse Anesthetist	1974	Pediatric NP	24		0		1		23	(5)	82%
Obstetrics/Pediatrics	1976	Family NP	65		0		13		52	(16)	76%
Obstetrics/Pediatrics	1980	Women's Health NP	20		0		0		20	7	154%
Obstetrics/Pediatrics	1981	Nurse Midwife	29		0		3		26	(1)	96%
Obstetrics/Pediatrics	1806D	Healthcare Manag PhD	0		0		0		0	(1)	0%
Administration	1900D	Nursing PhD	11		0		1		10	0	100%
Administration	1972D	CRNA PhD	7		0		2		5	1	125%
Certified Registered Nurse Anesthetist		TPPH									
Total			2,742	+	34	-	159	=	2,617	(313)	89.3%
Total IIC Officers					2,776				Total IIC Billets	(307)	90.0%
FOOTNOTES:											
1. SUBSP inventory captures all NC officers with reported primary subspecialty code regardless of assignment. Does not include the Admirals											
2. FY07 Manpower Authorizations (billets) based on 200701 extract of TFMMS, includes both coded and non-coded billets.											
3. 2XXX share as determined by BUPERS, PERS-N131M											
Prepared by NAVMED MPT&E, NC Personnel Plans, 301-295-1779											

Table 2. Reserve NNC Billets Authorized by Subspecialty (from CAPT M. Shannon, *M1C1 Nurse Corps RC Specialty Report as of 29 MAR 06*, Excel Spreadsheet emailed Apr 2006.)

M1C1 NURSE CORPS RC SPECIALTY REPORT AS OF 29 MAR 06						
Identifier for subspecialty codes in the regression model	SUBSP CODE	SUBSPECIALTY DESCRIPTION	INVENTORY	BILLETS AUTH	DELTA	% MANNED
Administration	3150	E & T Management	0	2	(2)	0%
General Nurse	1900	Professional Nursing	286	226	60	127%
Administration	1901	Nursing Adm	32	15	17	213%
Medical/Surgical	1910	Med/Sug	277	236	41	117%
Obstetrics/Pediatrics	1920	Maternal Infant	47	49	(2)	96%
Obstetrics/Pediatrics	1922	Pediatric Nursing	21	15	6	140%
Psychiatric Nursing	1930	Psychiatric Nursing	36	40	(4)	90%
Obstetrics/Pediatrics	1940	Community Health	1	4	(3)	25%
Obstetrics/Pediatrics	1945	ER/Trauma Nursing	90	85	5	106%
Operating Room	1950	Perioperative Nursing	176	186	(10)	95%
Critical care/Intensive Care Unit	1960	Critical Care Nursing	290	289	1	100%
Critical care/Intensive Care Unit	1964	NICU Nursing	15	25	(10)	60%
Certified Registered Nurse Anesthetist	1972	Nurse Anesthesia	72	94	(22)	77%
Obstetrics/Pediatrics	1974	Pediatric NP	12	16	(4)	75%
Obstetrics/Pediatrics	1976	Family NP	57	29	28	197%
Obstetrics/Pediatrics	1980	Women's Health NP	7	6	1	117%
Obstetrics/Pediatrics	1981	Nurse Midwife	14	16	(2)	88%
		No SSC Assigned	25	2	23	1250%
Total NC Officers			1,458	1,335	123	109.2%

C. RESEARCH QUESTIONS

The purpose of this thesis is twofold. First, we analyze the factors that influence an active duty nurse's decision to stay on active duty. Second, we analyze factors that influence a nurse's decision to affiliate with the reserves once they leave active duty. Figure 1 depicts the career decision flow points for an active duty nurse. The specific research questions to be explored are as follows:

1. Active Duty Questions

- What demographic and organizational factors affect the retention of active Navy Nurse Corps Officers?
- What organizational design changes should be made to alleviate retention problems and what further retention methods would be most effective to decrease and reverse the manning shortage?

2. Reserve Duty Questions

- What demographic and organizational factors determine if Navy nurses will join the Reserve Component if they leave the Active Component?
- What underlying organizational systems are inhibiting or enhancing the desire of the Navy nurse to stay Navy, transfer to the Reserves or become a civilian nurse?
- What is civilian sector nursing doing to effectively address their own recruitment and retention problems?

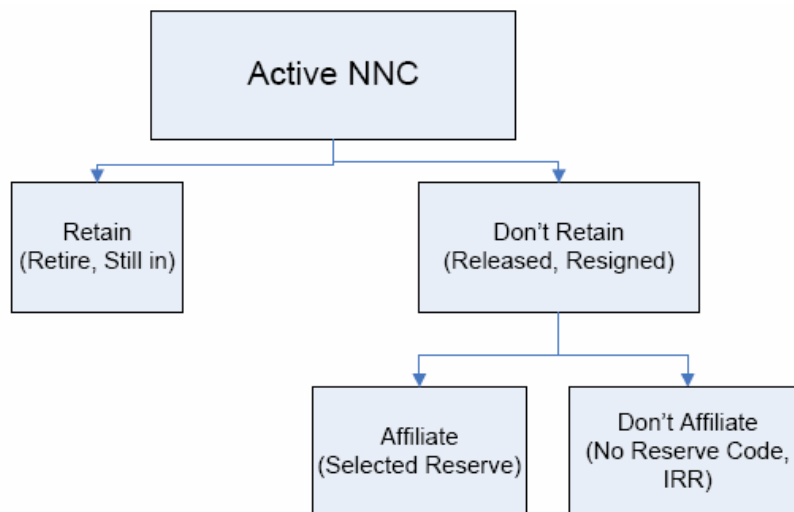


Figure 1. Navy Nurse Corps Flow Chart

D. ORGANIZATION OF STUDY

The rest of the thesis proceeds as follows. Chapter II is a literature review discussing the civilian nursing recruiting and retention problems, the military nursing recruiting and retention problems and the factors affecting overall reserve affiliation. This chapter highlights current and past studies assessing nursing and Reserve retention and recruitment. Chapter III provides an overview of two widely accepted models for systems theory – the Organizational Systems model and the Organizational Configurations model. This chapter also discusses various internal and external factors affecting NNC accession and retention. Chapter IV discusses the sources of the dataset and the methods used for regressions, plus the definitions of the variables in the regressions. Chapter V will discuss

the preliminary data analysis and construction of the active retention model and the reserve affiliation model. Chapter VI will discuss the results of these two regressions. Chapter VII will conclude by tying together the systems analysis with the regression results to make recommendations for the Navy Nurse Corps and recommendations for further study.

II. LITERATURE REVIEW

A. OVERVIEW

This chapter summarizes prior research accomplished in the fields of civilian and medical nursing, followed by research regarding affiliation with the reserves.

B. CIVILIAN NURSING VICIOUS CYCLE

Unfortunately, the vicious cycle is clear: persistent shortages and increasing demands for and on civilian nurses leads to burn-out, which negatively impacts recruiting and retention, exacerbating shortages. As shown in Figure 2, there is likely to be a severe gap between supply and demand for nurses in 2020 “from a projected 40 percent increase in demand compared to a projected six percent growth in supply.”⁶ The Health Resources and Services Administration (HRSA) cites that the growth in demand will be caused by increases in population, particularly among healthcare intensive elderly people, advances in medical technology that require more skilled nurses, and the increasing demand for nurses to fill expanding roles.⁷

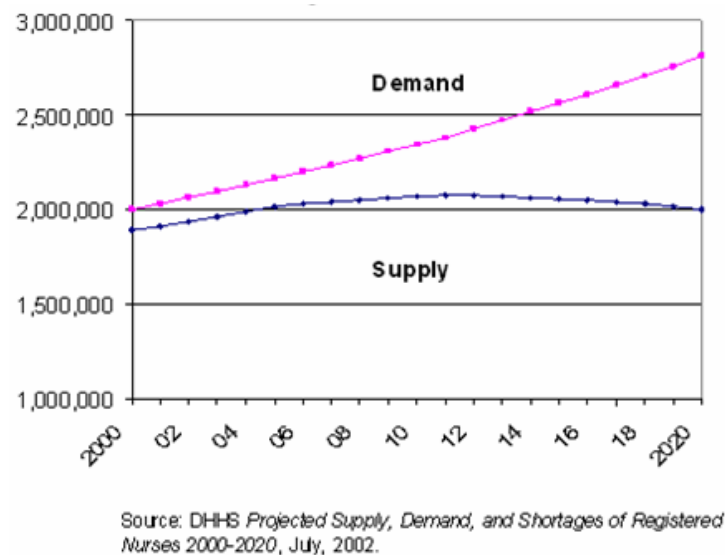


Figure 2. Supply vs Demand Projections for Nurses in 2020 (From *HRSA Responds to the Nursing Shortage Results from the 2003 Nursing Scholarship Program & The Nursing Education Loan Repayment Program: 2002- 2003.*)

⁶ United States Dept of Health and Human Services. *HRSA Responds to the Nursing Shortage Results from the 2003 Nursing Scholarship Program & The Nursing Education Loan Repayment Program: 2002-2003*. <http://bhpr.hrsa.gov/nursing/2003NELRPNSPRTC/Chapter1.htm>, (Accessed May 2006).

⁷ Ibid.

The following sections discuss factors affecting recruitment and retention from the civilian perspective, including alternative resolutions.

1. Civilian Factors Affecting Recruitment and Retention

The factors affecting civilian nursing recruitment and retention can be divided into four main categories: decreased supply of nurses; decline in relative earnings; non-supportive work environments; and high job stress.

a. Decreased Supply of Nurses

The overall supply of nurses in the civilian workforce continues to decline due partly to the average aging of the nursing population and a lack of available nursing instructors. In 2000, the average age of a registered nurse (RN) was 43.3 years and, in 2003, one third of RNs were over 50.⁸ The U.S. Government Accountability Office (GAO) states that “40 percent of the current nurse workforce will be ... nearing retirement age by the year 2010.”⁹ Figure 3 depicts the rise in the average age of nurses.

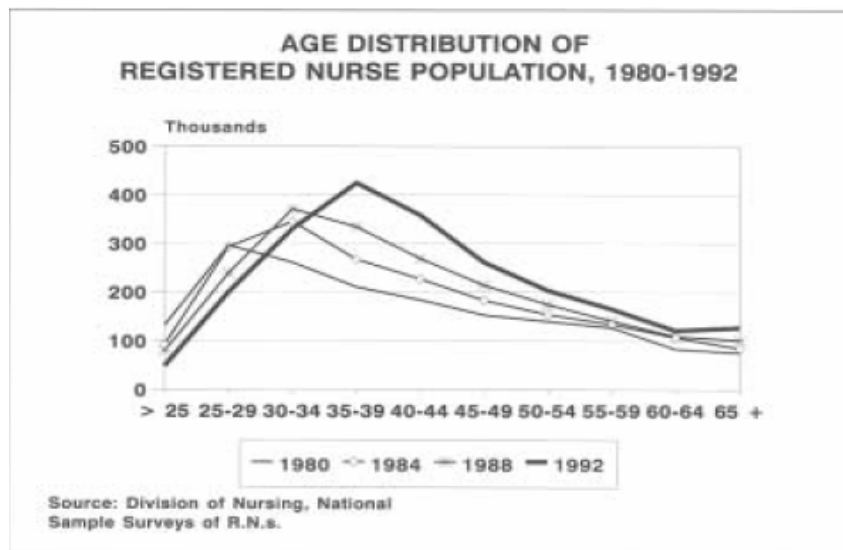


Figure 3. Increase in Average Age of Civilian Nurses (From National Advisory Council on Nurse Education and Practice, *Second Report to the Secretary of Health and Human Services and the Congress*. Nov 2002.)

⁸ B. Atencio, J. Cohen, & B. Gorenberg. (2003). *Nurse Retention: Is It Worth It?* (2003) www.Medscape.com, (Accessed May 2006).

⁹ United States Dept of Health and Human Services. *HRSA Responds to the Nursing Shortage Results from the 2003 Nursing Scholarship Program & The Nursing Education Loan Repayment Program: 2002-2003*. <http://bhpr.hrsa.gov/nursing/2003NELRPNSPRTC/Chapter1.htm>, (Accessed May 2006).

The average age of nursing instructors in 2003 was 49 years.¹⁰ This is partly due to the length of time it takes for a RN to become a qualified instructor. See Figure 4 for the age distribution of RN faculty. A RN must have a master's degree in order to become an instructor and the average age of nurses receiving their master's degree is 34.5 years.¹¹ Plus, the average time it takes a RN to go from a baccalaureate to a doctoral degree is 20.9 years, as compared to 12.7 years for all disciplines on average.¹² The lack of RN faculty is a major reason why over one third of nursing schools decline nursing school applications. "In 2002, nursing schools turned away over 5,200 qualified applicants because they did not have enough faculty."¹³

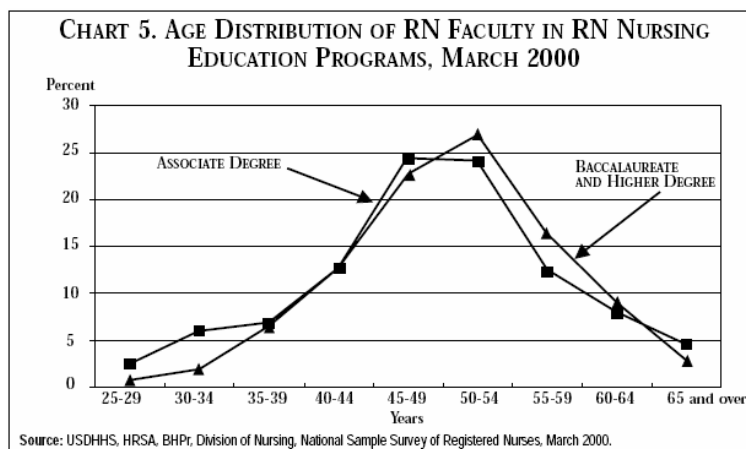


Figure 4. Age Distribution of RN Faculty (From National Advisory Council on Nurse Education and Practice, *Second Report to the Secretary of Health and Human Services and the Congress*. Nov 2002.)

Another reason why there is a lack of nursing instructors is the nurses who have master's degrees can work in specialized nursing positions with an average salary of \$61,262 as opposed to the average nursing instructor salary of \$48,410.¹⁴ The cause for

¹⁰ B. Atencio, J. Cohen,, &B. Gorenberg, (2003). *Nurse Retention: Is It Worth It?* (2003) www.Medscape.com, (Accessed May 2006).

¹¹ National Advisory Council on Nurse Education and Practice, *Second Report to the Secretary of Health and Human Services and the Congress*. Nov 2002.

¹² Ibid.

¹³ United States Dept of Health and Human Services. *HRSA Responds to the Nursing Shortage Results from the 2003 Nursing Scholarship Program & The Nursing Education Loan Repayment Program: 2002- 2003*. <http://bhpr.hrsa.gov/nursing/2003NELRPNSPRTC/Chapter1.htm>, (Accessed May 2006).

¹⁴ National Advisory Council on Nurse Education and Practice, *Second Report to the Secretary of Health and Human Services and the Congress*. Nov 2002.

the disparity in wages is somewhat ironic since it mostly stems from hospitals attempting to recruit high quality nurses by raising salaries.¹⁵ Overall, in the coming years the nursing community will experience a nursing educator shortage, limited nursing school capacities and a sizable portion of the overall nurse population retiring.¹⁶

Another reason for the decline in supply of nurses is that a majority of nurses are female and are splitting their time between work and child rearing commitments.¹⁷ Plus, there are an increasing number of job opportunities available to women that were not available before.¹⁸

b. Decline in Relative Earnings

According to the Department of Health and Human Services (DHHS), the average real salary increase for RNs from 1992 to 2000 was only \$200. Plus, the majority of the increase in salary is seen early in a nurse's career, encouraging more experienced nurses to leave the nursing profession.¹⁹ Figure 5 depicts the real increase in the average salary of RNs from 1980 to 2000.

¹⁵ J. May, G. Bazzoli, and A. Gerland, "Market Watch: Hospitals' Responses to Nurse Staffing Shortages," *Health Affairs* 25 (2006).

¹⁶ B. Atencio, J. Cohen, & B. Gorenberg. *Nurse Retention: Is It Worth It?* (2003) www.Medscape.com, (Accessed May 2006).

¹⁷ National Advisory Council on Nurse Education and Practice, *Second Report to the Secretary of Health and Human Services and the Congress*. Nov 2002.

¹⁸ S. Grant. "Stemming the Tide of the Nursing Shortage." *The Cerner Quarterly* 2 (1996).

¹⁹ United States Dept of Health and Human Services. *HRSA Responds to the Nursing Shortage Results from the 2003 Nursing Scholarship Program & The Nursing Education Loan Repayment Program: 2002- 2003*. <http://bhpr.hrsa.gov/nursing/2003NELRPNSPRTC/Chapter1.htm>, (Accessed May 2006).

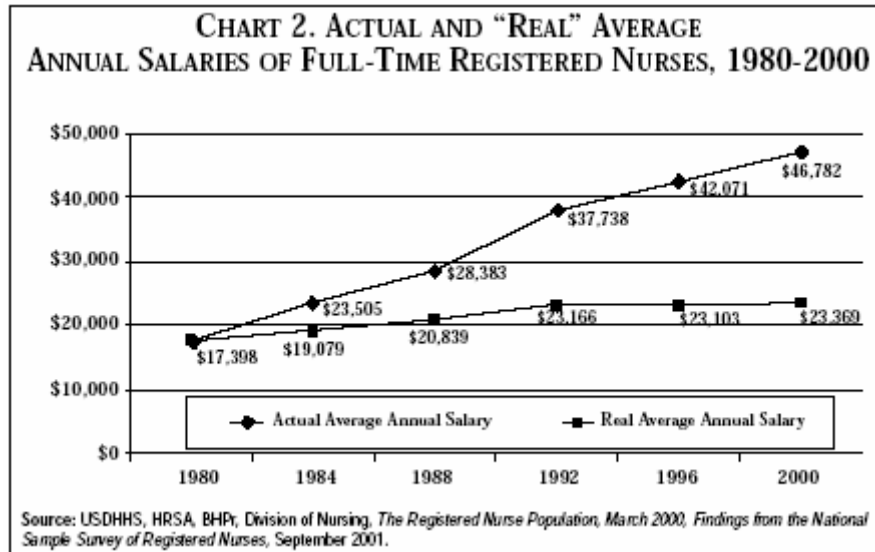


Figure 5. Real Average Salary for RNs (From National Advisory Council on Nurse Education and Practice, *Second Report to the Secretary of Health and Human Services and the Congress*. Nov 2002.)

c. Non-Supportive Work Environment

Several factors are cited as contributing to a non-supportive work environment for many RNs. These include nurse-physician conflicts which adversely affect organizational climate, environmental uncertainty, decreased autonomy, mixed perceptions of effective leadership, lack of space and equipment.²⁰ Also cited are limited advancement opportunities and a general lack of respect.²¹

d. Stressful Jobs

Several factors are cited as contributing to an increase in job stress. These include high patient to nurse ratios, burnout, undesirable work hours, mandatory overtime, overload, exhaustion, acute patients, high patient turnover, high nurse turnover and a persistent cycle of understaffing. Each patient over a 1:4 nurse to patient ratio increases nurse burnout by 23 percent and job dissatisfaction by 15 percent.²² In fact, “one out of every five nurses working is considering leaving the patient care field for reasons other than retirement within the next five years” due to job burnout and

²⁰ B. Atencio, J. Cohen, & B. Gorenberg. *Nurse Retention: Is It Worth It?*(2003) www.Medscape.com, (Accessed May 2006).

²¹ Office of Inspector General Office of Analysis and Inspections, *Hospital Best Practices for Recruitment and Retention*. Nov 1988.

²² B. Atencio, J. Cohen, & B. Gorenberg. (2003). *Nurse Retention: Is It Worth It?*(2003) www.Medscape.com, (Accessed May 2006).

dissatisfaction, which is exacerbated by a reduction in nurse leadership and the respect of the opinion of nurses regarding patient healthcare.²³

Understaffing is the primary cause for nurses being overworked, exhausted and not being able to take care of patients to the desired high level of quality.²⁴ Even if understaffing is fixed by requiring certain nurse to patient ratios, this will not alleviate the problem unless “controls are placed on the numbers of non-nursing tasks that nurses are required to perform.”²⁵ The understaffing problem creates a vicious cycle in that, “Fewer people are working in nursing, which has led to a shortage. Because of the shortage, nurses who remain in the hospital must care for more patients under increasingly difficult working conditions. Because of these strained working conditions, more nurses leave the hospital workforce, thereby worsening the shortage and making recruitment of new nurses more difficult.”²⁶

2. Civilian Solutions to the Recruitment and Retention Problem

a. Increase the Supply of Nurses

Some articles discuss various ways of increasing the supply of nurses such as providing childcare, expanding educational resources, providing online courses, and attracting the minority section of the population.²⁷ Figure 6 shows that as of 1992 only nine percent of RNs were minorities, indicating a potential untapped resource.²⁸

²³ United States Dept of Health and Human Services. *HRSA Responds to the Nursing Shortage Results from the 2003 Nursing Scholarship Program & The Nursing Education Loan Repayment Program: 2002- 2003*. <http://bhpr.hrsa.gov/nursing/2003NELRPNSPRTC/Chapter1.htm>, (Accessed May 2006).

²⁴ G. Lafer, *Solving the Nursing Shortage: Best Practices for Recruitment and Retention of Nurses*. www.afscme.org/publications/1193.cfm, (Accessed May 2006).

²⁵ Office of Inspector General Office of Analysis and Inspections, *Hospital Best Practices for Recruitment and Retention*. Nov 1988.

²⁶ S. Grant. “Stemming the Tide of the Nursing Shortage.” *The Cerner Quarterly* 2 (1996).

²⁷ National Advisory Council on Nurse Education and Practice, *Second Report to the Secretary of Health and Human Services and the Congress*. Nov 2002.

²⁸ National Advisory Council on Nurse Education and Practice, *Report to the Secretary of the Department of Health and Human Services on the Basic Registered Nurse Workforce*. Apr 1996.

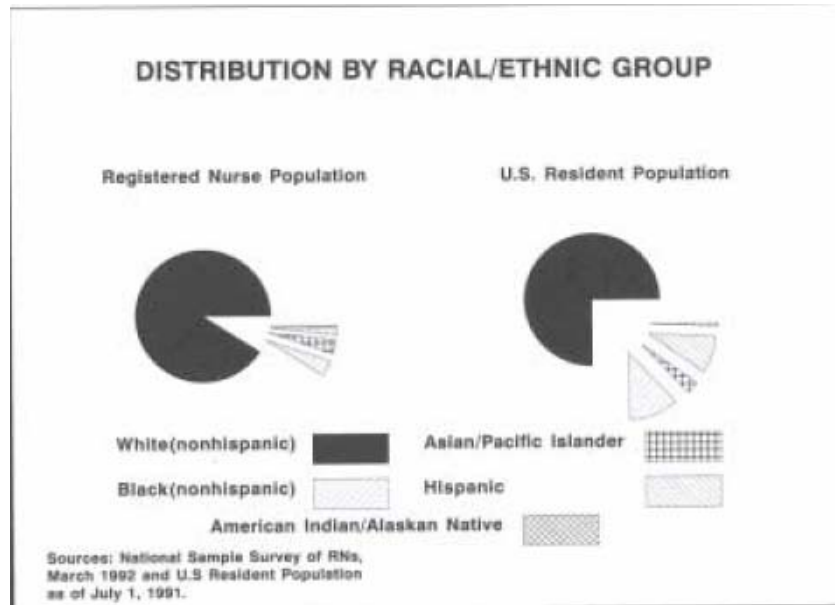


Figure 6. Distribution of RNs by Racial/Ethnic Group (From National Advisory Council on Nurse Education and Practice, *Report to the Secretary of the Department of Health and Human Services on the Basic Registered Nurse Workforce*. Apr 1996.)

b. Increase Relative Earnings

Additional articles suggest ways to increase salary to attract nurses or keep nurses where they are currently employed, e.g., straight salary raises, bonuses for working odd hours, bonuses for recruiting other nurses, sign-on bonuses, retention bonuses and increasing educational benefits. Two major nursing education programs were created and enhanced by the Nurse Reinvestment Act of 2002. These were the Nursing Scholarship Program (NSP) and the Nursing Education Loan Repayment Program (NELRP). The NSP “offers scholarships to individuals for attendance at schools of nursing in exchange for service in health care facilities with a critical shortage of nurses” for a minimum of two years.²⁹ The NELRP also requires a nurse to work in a critical shortage area for two to three years and will pay up to 85 percent of the RN’s nursing school loan balance.

c. Improved Work Environment

Various suggestions to improve the work environment include increasing nurse autonomy, providing more flexible work hours to allow for a balance of work and

²⁹ United States Dept of Health and Human Services. *HRSA Responds to the Nursing Shortage Results from the 2003 Nursing Scholarship Program & The Nursing Education Loan Repayment Program: 2002- 2003*. <http://bhpr.hrsa.gov/nursing/2003NELRPNSPRTC/Chapter1.htm>, (Accessed May 2006).

home life, improving and using technology to reduce workload, providing mentors for new nurses, supplying orientation and training programs so nurses can determine what area is best for them to work in, and continually updating nursing skills. Other suggestions include involving nurses in decision making processes, improving relations and communications between nursing and other medical staff, involving more nurses on hospital committees, encouraging and rewarding nurse leadership accomplishments, and ensuring a respectful work environment.

d. Reducing Stress at Work

A traditional method of reducing RN work stress translates into improving staffing levels. “Staffing levels are often a prerequisite for other best practices” of recruiting and retaining nurses.³⁰ Improving staffing ratios will improve autonomy, reduce exhaustion, increase job satisfaction and increase the quality of patient care.³¹ The challenge to improving staffing ratios is to also pay attention to the other administrative duties the RN has and reduce those as well. Other ways to reduce stress include reducing overtime and paperwork. In fact, one study states that money is more wisely spent on hiring more nurses than forcing overtime. “Two nurses working a total of four hours of overtime equals six hours of regular nurse wages.”³²

C. ACTIVE MILITARY NURSING

1. Introduction

The civilian nursing shortage that has been highlighted in the preceding section is also found in the military nursing community. In a recent article in the Voice of Federal Medicine, Navy Surgeon General, Vice Adm. Donald Arthur, MC, USN reports that he is very worried about the growing shortfalls in the military medical community.³³ The article explains that throughout military medicine there are shortfalls in recruitment and retention of nurses in all three of the services. In 2005, the Air Force Nurse Corps (AFNC) had a shortfall of about 516 nurses, the Navy Nurse Corps (NNC) a shortfall of

³⁰ G. Lafer, *Solving the Nursing Shortage: Best Practices for Recruitment and Retention of Nurses*, www.afscme.org/publications/1193.cfm, (Accessed May 2006).

³¹ Ibid.

³² B. Atencio, J. Cohen, & B. Gorenberg, *Nurse Retention: Is It Worth It?* (2003) www.Medscape.com, (Accessed May 2006).

³³ S. Basu, *Military Recruiting Shortfalls Worry DoD Leaders*, <http://www.usmedicine.com/article.cfm?articleID=1315&issueID=88>, (Accessed June 2006).

about 175 nurses, and the active component of the Army Nurse Corps (ANC) reported a shortfall of 320 nurses.³⁴ It was highlighted earlier that the civilian nursing shortage is projected to markedly increase in future years. Civilian health care agencies are discovering that it is very costly to recruit and retain nurses. The military has greater control over the retention rate of its nurses compared to the civilian healthcare system due to the fact that a NNC officer must give twelve months notice if they want to leave the military. A civilian nurse is not bound by law to show up the next day for work and will, on average, only give a two week notice to leave.

The Department of Defense also has laws that can affect the retention of all military members. One of the tools used to help maintain military personnel is Title 10 United States Code 12305, which is a law that gives “authority of the president to suspend certain laws relating to promotion, retirement, and separation.”³⁵ When the Navy sent out a stop loss message in September of 2001, it defined a stop loss as “a program which allows the service to temporarily halt all separations and retirement during times of war, deployments or National Emergency.”³⁶ Stop loss orders can affect the entire military or only specific fields or specialties. Stop loss orders were used during the first Gulf war. The most recent stop loss order was given on 30 April 2002 stated that all NNC officers (290X) with subspecialty codes 1930(Psych), 1945(Emergency Room), 1950(Operating Room), 1960(Critical Care), 1972(Nurse Anesthetist), or 1976 (Obstetrics) would be retained under stop loss orders for the duration of the national emergency.³⁷ When a stop loss order is enacted it is not capped, meaning that it can be amended by adding more specialties to the original order as needed. The stop loss by law should end once the president has declared an end to the national emergency. Stop loss has been used multiple times since President Bush declared a national emergency in 2001, as shown in Table 3.

³⁴ S. Basu, *Military Recruiting Shortfalls Worry DoD Leaders*, <http://www.usmedicine.com/article.cfm?articleID=1315&issueID=88>, (Accessed June 2006).

³⁵ Cornell Law School Web Page, *Authority of President to Suspend Certain Laws Relating to Promotion, Retirement, and Separation*.

³⁶ Clark, V., CNO, *Suspension of Provisions of Law and Navy Policy Relating to Retirement or Separation*. Washington DC: Sep 2001.

³⁷ Clark, V., CNO, *Stop Loss Policy and Procedures*. <http://www.npc.navy.mil/NR/rdonlyres/AA38FC51-4662-4C78-BDAC-180789517BFA/0/nav02121.txt>, Washington DC: Apr 2002.

Table 3. Stop Loss Utilization by Military Service (From *Military Personnel: DOD Needs to Address Long Term Reserve Force Availability and Related Mobilization and Demobilization Issues*. GAO 04-1031, Sep 2004.)

ARMY	JANUARY 2002
	FEBRUARY 2002
	JUNE 2002
	NOVEMBER 2002
	FEBRUARY 2003
	NOVEMBER 2003
NAVY	SEPTEMBER 2001
	MARCH 2002, EXTENDED TO NOV 2003
AIR FORCE	SEPTEMBER 2001
	JANUARY 2002
	JUNE 2002
	MARCH 2003
	MAY 2003
	JUNE 2003 ENDS
MARINE CORPS	JANUARY 2002
	JANUARY 2003
	MAY 2003

2. Accession Sources

Several studies have analyzed whether different methods of accession affect NNC retention rates differently. Below is a description of each NNC accession source and a summary of the studies' findings.

a. *Naval Reserve Officer Training Corps (NROTC)*

The NROTC scholarship is open to interested candidates that are pursuing a Bachelor of Science degree in Nursing (BSN). The scholarship pays for tuition, books, lab fees, plus an allowance for subsistence. The candidate must participate in weekly ROTC drills and two summer training cycles that last four weeks.

Upon completion of the program, the candidate is commissioned in the NNC and is obligated to eight years of military service, of which four years must be on

active duty.³⁸ Overall average per person cost of the NROTC program was calculated at \$86,000 by T. Maeder in 1999.³⁹

b. Medical Enlisted Commissioning Program (MECP)

The Medical Enlisted Commissioning Program (MECP) is an in-service procurement program (IPP) that gives qualified enlisted men and women a chance to earn a bachelors degree in nursing and be appointed as an Ensign in the NNC.⁴⁰ This program is open to all enlisted personnel who are at least 19 years of age and have completed a minimum of 30 semester hours of undergraduate studies. Overall average per person cost of the MECP program was calculated at \$74,781.⁴¹

c. Nurse Candidate Program (NCP)

The NCP is a program provided to students who are currently enrolled in a baccalaureate degree program. The benefits of the program are:

- An accession bonus of \$10,000.
 - (a) \$5,000 will be paid upon enlistment into the program.
 - (b) \$5,000 will be paid on the six-month anniversary of enlistment.
- Continuation bonus of \$1000 per month for each month enrolled as a full-time student for a maximum of 24 months of payment. Entitlement for the continuation bonus terminates when enrollment in the baccalaureate degree in nursing program ends.
- Full pay and allowances of grade appointed to in the Nurse Corps upon commissioning and execution of active duty orders.

After graduating and obtaining their nursing license, the nursing candidate will attend Officer Indoctrination Training. The candidates are obligated to four years of active service if they entered the program during their senior year in college or five years

³⁸ Naval Reserve Officer Training Corps Web Page, *Nursing Option*, <https://www.nrotc.navy.mil/nursingoption.cfm>, (Accessed July 2006).

³⁹ T. Maeder, "The Costs and Benefits of the Navy Nurse Corps Accession Sources," (Monterey, California: Naval Postgraduate School, December 1999).

⁴⁰ United States Navy Web Page, *Medical Enlisted Commissioning Program – Navy MECP*, <http://www.navyadvancement.com/development/navy-programs/medical-enlisted-commissioning.php>, (Accessed July 2006).

⁴¹ T. Maeder, "The Costs and Benefits of the Navy Nurse Corps Accession Sources," (Monterey, California: Naval Postgraduate School, December 1999).

of active service if they entered during their junior year of college.⁴² Overall average per person cost of an NCP officer was calculated at \$30,045.⁴³

d. Direct Accession

Nurses who enter the Navy through direct accession, in general, do not have any prior military experience. If they are selected, they must be able to complete 20 years of service before age 55. There have been some significant changes in this program due to the shortage of nurse accessions. The accession bonus has changed dramatically from the original \$5,000 dollar sign on bonus to a \$15,000 bonus for a three year obligation and \$20,000 bonus for a four year obligation. Overall average per person cost of a direct accession was calculated at \$18, 145 with bonus and \$13,145 without bonus.⁴⁴

The effectiveness of each type of accession source on retention rates was calculated by T.K. Maeder in 1999 and G. Zangaros in 2005. Full Time Out-Service Training (FTOST) and Baccalaureate Degree Completion Program (BDGP) were discontinued after the original study, yet are shown in Table 4 as programs that appeared more effective than programs currently maintained.

⁴² United States Navy Web Page, *Medical Programs*, <http://www.cnrc.navy.mil/noru/orojt/medicalofficer.htm>, (Accessed July 2006).

⁴³ Ibid.

⁴⁴ T. Maeder, "The Costs and Benefits of the Navy Nurse Corps Accession Sources," (Monterey, California: Naval Postgraduate School, December 1999).

Table 4. Comparison of Effect of Accession Source on Retention

Accession Source	Maeder: Retention Rates of Cohort NNC Officers 1992-1994	Zangaros: Retention Rates of Cohort NNC Officers 2000-2005
MECP	90%	91%
NCP	61%	64%
Direct	44%	64%
NROTC	42%	54%
FTOST	77%	N/A
HSCP/BDCP	50%	N/A

MECP continually shows the best overall retention rate over five years. This can be explained by the fact that most of the nurses in this category have decided to make the NNC a career to retirement. The 20 year retirement for this group may come at the O3 or O4 level. This can create a problem for the NNC if they are working to build leaders at the O4 to O6 level. So, while building up the NNC with MECP nurses may help in the short run, it may be shortsighted to shift accessions towards MECP personnel without looking at longer retention cutoffs, i.e. 10 years.

3. Prior Assessment of the Navy Nurse Corps

A recent thesis completed by Daniel Kinstler and Raymond Johnson assessed the flow of Navy Nurse accessions and retentions to develop a force shaping tool to assist the NNC in their manpower needs for the future.⁴⁵ In the study, Markov models were used to identify the flow of personnel in the ranks of ENS through LCDR. The implementation of the Markov models relies heavily on having an established robust strategic accession plan. At the time of the study Kinstler and Johnson were not able to acquire the accession plan for the NNC. From the data they did have, they attempted to develop models to assist with accessioning of Navy nurses. The Markov models they developed highlighted that, under the current policies of the NNC, the developed models could optimize accessions for a two year period. A thesis completed in 1998 by Paula

⁴⁵ D. Kinstler and R. Johnson, "Developing a Markov Model to be Used as a Force Shaping Tool for the Navy Nurse Corps," (Monterey, California: Naval Postgraduate School, March 2005).

Jonak and Rosemarie Paradis assessed the various accession sources as a predictor of success.⁴⁶ The results of the study were inconclusive but, in general, there appears to be a connection between accession sources, length of service and promotion rate. In a follow-on study to the Jonak and Paradis thesis, Tamar Nader analyzed the cost and benefits of various NNC accession sources.⁴⁷ The main outcome of Nader's study showed that males and those individuals who were commissioned into the NNC through MECP were most likely to stay in past their initial obligation. The results in both studies showed that developing and growing NNC officers, by training and educating enlisted personnel, appears to be the most effective tool the NNC has in retaining nurses beyond their initial obligations. The main problem with growing a large portion of the nurses from the enlisted ranks is that they have the propensity to retire at the O-3 or early O-4 time period. This is a problem when the NNC is attempting to grow leaders who will stay through the O4 to O6 critical leadership levels. A second factor that was highlighted in both studies was that the NROTC program has not been cost effective because few of these nurses stay beyond their initial obligation and do not promote as well compared to prior enlisted personnel.

4. Current Assessment of the Navy Nurse Corps

The NNC is an organization that is comprised of 3,065 authorized billets. The shortfall that was reported by Vice Admiral Arthur in 2005 has increased to 275 nurses with overall manning at 91.4 percent by August 2006.⁴⁸ The projected loss rate by July 2006 was 11.34 percent (330 nurses).⁴⁹ Table 1 shows the NNC manning as of January 2007.

⁴⁶ P. Jonak & R. Paradis, "An Analysis of the Effects of Accession Source as a Predictor of Success of Navy Nurse Corps Officers," (Monterey, California: Naval Postgraduate School, March 1998).

⁴⁷ T. Maeder, "The Costs and Benefits of the Navy Nurse Corps Accession Sources," (Monterey, California: Naval Postgraduate School, December 1999).

⁴⁸ V. Morrison, *Nurse Corps Specialty Report as of August 2006*, Excel Spreadsheet emailed Sep 2006.

⁴⁹ Ibid.

The NNC has formed retention teams and midlevel leadership development groups to determine ways to increase accessions and retention rates throughout the NNC.⁵⁰ One of the goals of the committee is to complete an assessment of factors affecting retention rates. A data analysis, completed by LCDR George Zangaros in December 2005, showed that the Nurse Corps end strength was at its lowest level in 13 years.⁵¹

5. The Possible Effect of Operational Tempo on Retention of Active NNC Officers

Since the attack of the twin towers on September 11, 2001, the operational tempo for almost all military members has increased. In a statement to the Senate Appropriations Committee in May 2005, Rear Admiral Lescavage, Director of the Navy Nurse Corps, highlighted that in the past year Navy nurses had been deployed to Kuwait, Iraq, Djibouti, Afghanistan, Bahrain, Philippines, Thailand and Guantanamo Bay, and and been involved in multiple humanitarian efforts such as the Indonesian tsunami and supplying Haitian relief. ⁵² In May 2006, Rear Admiral Bruzek-Kohler, Director of the Navy Nurse Corps, also highlighted many additional deployments around the world, including assisting the victims of hurricanes Rita and Katrina. ⁵³ There has not been a study that focuses on the impact of operational tempo on retention in the NNC, but in March of 2006, Raymond Bristol completed a thesis analyzing the impact of the increase in operational tempo on retention of Navy Medical Corps Officers post 9/11. In the study, Bristol noted an increase in the loss rate of general medical officers and specialties that are not in primary care as operational tempo was increased.⁵⁴

In the past four years the Army has also been adversely affected by operations in the Iraq and Afghanistan conflicts. In a recent study completed in August of 2005, Major Pablito R. Gahol, USA, looked at factors that are affecting retention in the Army Nurse

⁵⁰ V. Morrison, *Nurse Corps Specialty Report as of July 2006*, Excel Spreadsheet emailed Aug 2006.

⁵¹ G. Zangaros. *Data Analysis of Retention Factors*.
https://www.nko.navy.mil/portal/page?_afId=page11924 (Accessed Dec 2005).

⁵² RADM N. Lescavage, United States Senate Appropriations Committee, Subcommittee on Defense, *Navy Nurse Corps*. Washington: May 2005.

⁵³ RADM C. Bruzek-Kohler, United States Senate Appropriations Committee, Subcommittee on Defense, *Navy Nurse Corps*. Washington: May 2006.

⁵⁴ R. Bristol, "Effect of Increased Operational Tempo (Post 9/11) on the Retention of Navy Medical Corps Officers," (Monterey, California: Naval Postgraduate School, March 2006).

Corps (ANC). In the study, Gahol noted that the increase in operational tempo is having a directly negative effect on retention, especially at the O-3 level. Gahol assessed surveys of those nurses who had recently left the ANC and found that while 70 percent stated their intentions were to stay, the increase in operational tempo and, to a lesser extent, the opportunities in the civilian market gave the ANC officer the incentive to leave.

D. FACTORS AFFECTING RESERVE AFFILIATION

1. Enlisted Affiliation Factors Compared to Officer Affiliation

Reserve affiliation is defined as prior service individuals choosing to leave active duty and join the reserves. Most studies involving reserve affiliation focus on enlisted personnel. There are significant differences between officer and enlisted personnel, especially when focusing on the Navy Nurse Corps (NNC). The Navy Nurse Corps consists of a larger percentage of females, all of the officers must have at least a baccalaureate degree, and levels of ability and perseverance are arguably different than those of enlisted personnel. However, there may still be some insight gained from looking at what affects an enlisted person's decision to affiliate with the reserve.

Two main studies regarding enlisted reserve affiliation include a Center for Naval Analyses (CNA) study by Shiells in 1986 titled "Affiliation of Navy Veterans with the Selected Reserve"⁵⁵ and a thesis by Waite in 2005 titled "Affiliation of Navy Veterans with the Selected Reserve in the 21st Century,"⁵⁶ which studies enlisted personnel from 1990 to 2002. These studies both conclude that increased reserve pay and increased civilian unemployment increase the percentage of enlisted personnel who affiliate with the reserves. Also, minorities and females are more likely to join the reserves. It is generally accepted knowledge that an increase in civilian unemployment means fewer civilian jobs available to enlisted personnel, which has the commensurate affect of motivating military personnel to participate in the reserves for additional income. Civilian unemployment may not be such a powerful factor for NNC officers since there is a persistent demand for nurses nationwide. The reason cited for females and minorities

⁵⁵ M. Shiells, *Affiliation of Navy Veterans with the Selected Reserve*, Center for Naval Analysis, Dec 1986.

⁵⁶ J. Waite, "Affiliation of Naval Veterans with the Selected Reserve in the 21st Century," (Monterey, California: Naval Postgraduate School, March 2005).

affiliating with the reserves is that they have fewer job opportunities than non-minorities and men. This, again, may not hold true for the NNC since a larger percentage of the NNC is made up of women and job opportunities abound for nurses.

Another factor influencing affiliation is the region from which the person is either currently stationed or their home of record claimancy. Highest affiliation rates are seen in the mid-western and New England areas while the lowest affiliation rates are seen in the South Atlantic, Mountain, and Pacific regions.⁵⁷ Reasons cited for the variance include lifestyle choices, location of the Reserve Center, and rural versus urban environments. In both studies, unemployment rates in each region were taken into account and do not explain the regional variance in affiliation. Regions may be a factor as well for NNC officer affiliation.

Shiells' study found that those who advance more rapidly while on active duty are more likely to affiliate. Reasons cited for this are that perhaps the person foresees higher paygrades and earnings in the future with the reserves and they are better suited for the military lifestyle in general. This may also be a significant factor for the NNC.

Waite's thesis found that married people, people with children and older people tend not to affiliate with the reserves. A reason for this may be that these people are less willing to mobilize in the future. Waite also mentions moonlighting opportunities as a factor affecting affiliation. He states that "a poor economy decreases moonlighting opportunities and makes the reserves more attractive."⁵⁸ He finds that as moonlighting opportunities increase, reserve affiliation decreases because enlisted personnel choose to generate additional income from moonlighting rather than the reserves. He also finds that enlisted personnel with more technical ratings are able to find better full-time jobs and, therefore, do not need the extra income from the reserves or moonlighting. This may also be a significant factor for Navy nurses since there is a large supply of both full-time and moonlighting opportunities for nurses in the civilian sector.

⁵⁷ J. Waite, "Affiliation of Naval Veterans with the Selected Reserve in the 21st Century," (Monterey, California: Naval Postgraduate School, March 2005).

⁵⁸ J. Waite, "Affiliation of Naval Veterans with the Selected Reserve in the 21st Century," (Monterey, California: Naval Postgraduate School, March 2005).

2. Study of Officer Reserve Participation

A RAND report titled “Costs and Benefits of Reserve Participation” (1997) described both officer and enlisted participation in the reserves. This report included all the services, non-prior service and veterans, and lumped together recruitment and retention in the reserves. The report looked at a comparison of reserve surveys taken in 1986 and 1992 and also compared 1992 survey results between mobilized and non-mobilized reservists. Affiliation factors for the Navy are difficult to discern amongst all the data. However, general trends in this report about officers in the reserves are valuable.

a. Characteristics of the Reserve Job and the Individual

Four main areas that affect reserve participation are the characteristics of the reserve job, characteristics of the individual, characteristics of the civilian job and family support. Some of the characteristics of the reserve job that affect participation are motivation for reserve service, reserve pay, years of service, paygrade, satisfaction with pay, and satisfaction with training.⁵⁹ Some of the characteristics of the individual that affect participation are age, race/ethnicity, gender and education.⁶⁰ Most reserve officers have 10-20 years of service, are O-3s or O-4s, are 30-45 years old, and are male and married.

Overall, it was found that the three main reasons for participating with the reserves were retirement benefits, pride in accomplishment and service to country. Between 1986 and 1992, officers’ motivations for participating in the reserves had shifted slightly away from compensation and promotion and more towards patriotism and job satisfaction. This information must be viewed from the standpoint that Operation Desert Storm had just concluded and involved mobilization of reservists in a short, overwhelming success that was well supported by the country.

b. Characteristics of the Civilian Job

Characteristics of the civilian job that influence reserve participation include employer attitude toward reserve service, pay, type of civilian pay during reserve

⁵⁹ S. Kirby, D. Grissmer, S. Williamson & S. Naftel, *Costs and Benefits of Reserve Participation: New Evidence from the 1992 Reserve Components Survey*, Rand Corporation MR-812, 1997.

⁶⁰ Ibid.

participation, and availability for overtime pay.⁶¹ The RAND report states that a main dilemma for the reservist is that reserve duty takes time away from their civilian job, even more so when they are mobilized. This can affect not only pay but employee-supervisor relationships and promotion rates in the civilian job. Most reservists were found to have full-time or part-time work in the civilian world and 40 percent of officers worked in the public sector. Most reservists receive either both military and civilian pay while on reserve duty or military pay only. Also of note is the importance of foregone earnings from overtime and moonlighting. This may not be a substantial factor for officers since they are often in non-overtime roles and moonlight less. However, this is not the case for reserve nurses who are eligible for overtime and can find ample opportunities for moonlighting.

Evidently, a crucial characteristic of the civilian job that affects reserve participation is the employer's attitude toward reserve service. Most civilian employers were found to either not have an opinion, or to be in favor of their employees participating in the reserves. Officers, however, had a higher rate of employers with a serious problem with their reserve participation. The report indicates that this is because enlisted personnel tend to hold jobs which are easy to transfer from one person to another while officers do not. Of those employers saying reserve participation was a serious problem, most cited annual training as the most problematic.

c. Family Support

Family support factors include whether or not the individual has dependents, spouse attitude toward reserve service and family problems due to reserve service.⁶² About 20 percent of officers felt they spent too much time on the reserve job and have family problems as a result. The report also found that of those officers with spouses, approximately 11 percent had spouses with unfavorable attitudes toward reserve service.

d. Mobilization

The final part of the report studied how mobilization affected reserve participation and attitudes toward that participation. Again, this information is solely

⁶¹ S. Kirby, D. Grissmer, S. Williamson & S. Naftel, *Costs and Benefits of Reserve Participation: New Evidence from the 1992 Reserve Components Survey*, Rand Corporation MR-812, 1997.

⁶² Ibid.

from the 1992 survey and immediately follows the popular and successful Operation Desert Storm. It was found that “slowness of promotions, conflicts between attendance at unit drills and civilian jobs, desire for more leisure time or time to spend with family” were all greater reasons to leave the reserves than mobilization.⁶³ It was also found that mobilized officers were more likely to have spouses and employers with unfavorable attitudes toward reserve service as compared to their non-mobilized counterparts. The biggest concern for all reservists if they were mobilized was the loss of income. Single reservists worried about their civilian job, married people worried about their spouse’s attitude toward the reserves and people with dependents worried about childcare.

Overall, the RAND report warns that the findings they cite are influenced by Operation Desert Storm and could change significantly if future mobilizations are drastically different “in terms of magnitude, duration, or popularity.”⁶⁴ They further stated, “The increased chance to contribute in meaningful ways to real operations may need to be balanced against the increased likelihood of conflicts with both employers and families.”⁶⁵ Finally, they stated that a change in the type of mobilization will also change recruiting into the reserves as well.

⁶³ S. Kirby, D. Grissmer, S. Williamson & S. Naftel, *Costs and Benefits of Reserve Participation: New Evidence from the 1992 Reserve Components Survey*, Rand Corporation MR-812, 1997.

⁶⁴ Ibid.

⁶⁵ Ibid.

III. ORGANIZATIONAL THEORY AND DESIGN

A. OVERVIEW

The objective of this chapter is to consider the various factors affecting Navy Nurse Corps (NNC) accession and retention based on the widely accepted theoretical construct of systems theory.^{66,67} A system can be defined as “any set (group) of interdependent or temporally interacting *parts*. Parts are generally systems themselves and are composed of other parts, just as systems are generally parts or *holons* of other systems.”⁶⁸ This section will use an Organizational Systems model⁶⁹ as a subset of general systems theory. Additionally, an Organizational Configurations model will be used to simplify a constellation of factors relevant to the internal and external environment of the NNC.

B. SYSTEMS THEORY AND MODELS

There are various models that have been used to evaluate organizational design and effectiveness over the past 60 years, including:

1. Force Field Analysis (1951)
2. Leavitt’s Model (1965)
3. Likert System Analysis (1967)
4. Open Systems Theory (1966)
5. Weisbord’s Six-Box Model (1976)
6. Congruence Model for Organization Analysis (1977)
7. McKinsey 7S Framework (1981-82)
8. Tichy’s Technical Political Cultural (TPC) Framework (1983)
9. High-Performance Programming (1984)
10. Diagnosing Individual and Group Behavior (1987)
11. The Burke-Litwin Model of Organizational Performance and Change

66D. Nadler, and M. Tushman. *Managing Strategic Organizational Change: Frame Bending and Frame Breaking*. New York: Delta Consulting Group, 1986.

67P. Senge, P. *The Fifth Discipline: The Art and Practice of the Learning Organization*. New York: Doubleday, 1990.

68 Wikipedia Web Page, *Internet Dictionary: Systems*, <http://en.wikipedia.org/wiki/System> (Accessed Nov 2006).

69 N. Roberts, “The System Model,” (Monterey, California: Naval Post Graduate School, unpublished, 2000).

The above list was compiled in a white paper published in 2005.⁷⁰

The models stress different aspects of the relatively new and complex domain of organizational behavior, but often appear to be examining similar ideas. The model used in this thesis derives from open systems theory and is considered to be highly applicable for the topic. The Organizational Systems Framework (OSF) depicted in Figure 7 was developed by Professor Nancy Roberts.⁷¹ The concept of describing and assessing an organization as a grouping of interrelated external and internal components has earlier roots in biology and engineering. One of the great figures in nursing, Florence Nightingale, brought forth in medicine the need to care for the patient as a whole. “Florence Nightingale recognized the importance of caring for the whole person and encouraged interventions that enhanced individuals’ abilities to draw upon their own healing powers. She considered touch, light, aromatics, empathetic listening, music, quiet reflection, and similar healing measures as essential ingredients to good nursing care.”⁷²

A leading figure in the field of Organizational Behavior/Design, Peter Senge, highlighted in his book the Fifth Discipline the notion that throughout most of western scientific history, the best way to understand something is to break it up into its various components (reductionism).⁷³ What he explains in the Fifth Discipline is that this traditional method of thinking can be flawed, i.e., a hard drive, a modem, a monitor, a keyboard and a bunch of wires spread out on a table do not give justice to the device we call a computer; human body – same logic.

What modern systems theory brings to the table is that the sum is greater than its parts, including a different language depicting the real world of linkages, cycles, loops and delays. In organizations, the simple yet powerful hypothesis is that the fit of the variables determines performance, i.e., congruence or alignment. The OSF model is descriptive in that practically all real or imagined variables can be placed in the model. It

⁷⁰ S. Falletta, *Organizational Diagnostic Model: A Review & Synthesis*, Leadersphere White Paper, <http://www.leadersphere.com/img/Orgmodels.pdf>, (Accessed Dec 2005).

⁷¹ N. Roberts, “The System Model,” (Monterey, California: Naval Post Graduate School, unpublished, 2000).

⁷² American Holistic Nurses Association, *Position Statements 2004*, <http://www.ahna.org/events/fnight.html>, (Accessed Nov 2006).

⁷³ P. Senge, *The Fifth Discipline: The Art and Practice of the Learning Organization*. New York: Doubleday, 1990.

is also prescriptive in that when leaders and managers intervene such that incongruence among variables occurs, then poor performing is likely to emerge. The model includes: relevant external environmental forces and trends; a leadership domain of setting-direction and identifying and obtaining results; design variables such as people, processes and structure; and multiple results in terms of emerging culture, outputs and outcomes.

C. ORGANIZATIONAL SYSTEM FRAMEWORK

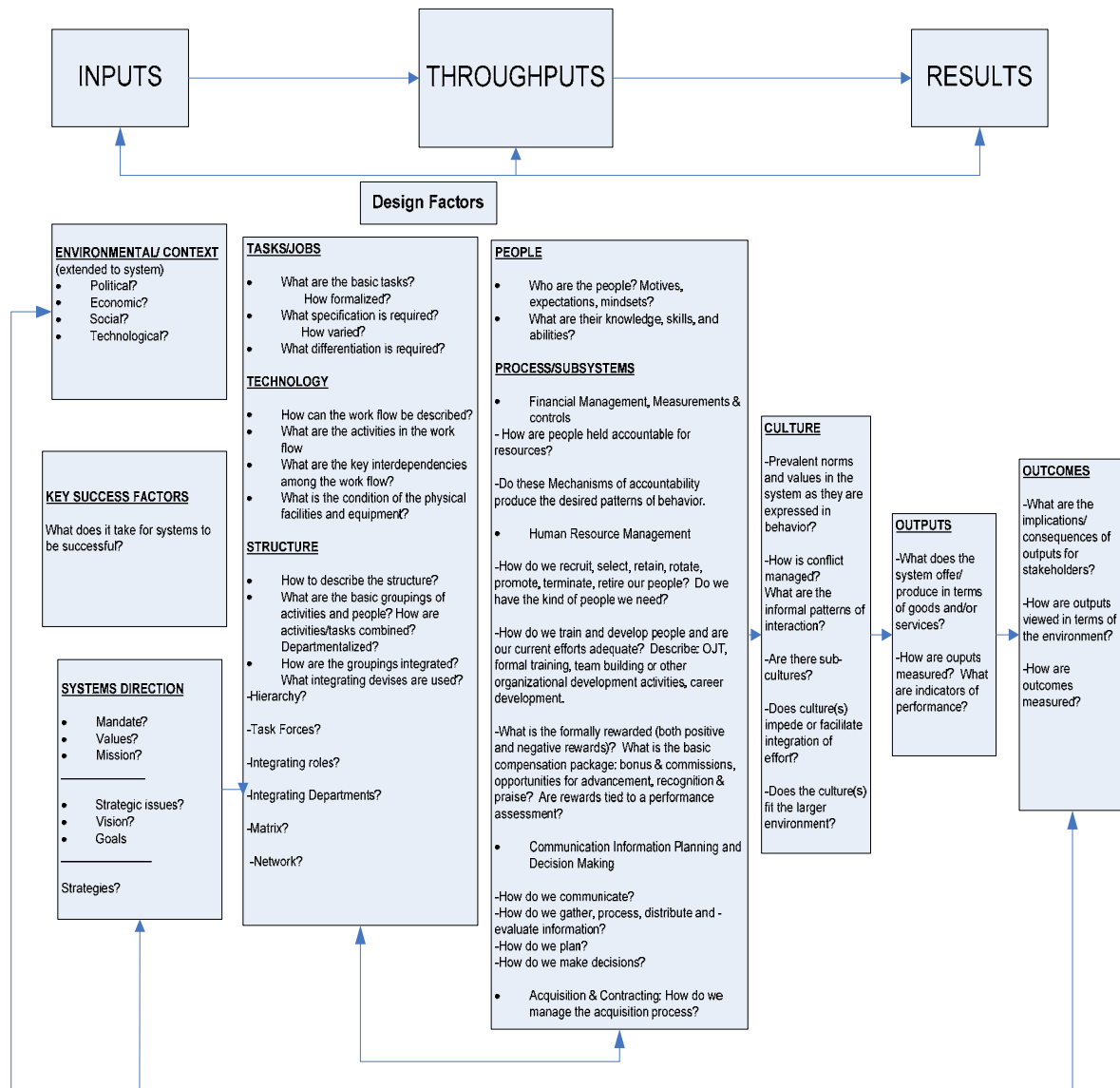


Figure 7. The Organizational Systems Framework (From N. Roberts, “The System Model”, (Monterey, California: Naval Postgraduate School, unpublished, 2000.)

1. Inputs

System input includes things like raw materials, but primarily refers to the senior executive leadership domain of setting-direction, i.e., through mission, vision, goals, policies, etc. “**Input** is the term denoting either an entrance or changes which are inserted into a system and which activate/modify a process.”⁷⁴ Inputs can also be described in terms of external environmental forces and trends affecting the organization, and key success factors (things the organization must do to achieve success).

a. *Environmental/Context*

The external environment can be described in terms of political, economic, technological, and societal forces and trends which may impact the organization, over which it has little to no control, e.g., the global war on terror. The four categories are not listed in any rank or precedence because the importance of each would vary with organizational context. Depending on the time of year, political factors (elections) may strongly influence the direction an organization takes in order to respond to important stakeholders. Of course socio-political factors can easily cross-over into economic or technical domains. Rapid advances in technology may stimulate the organization into adapting into unfamiliar areas, i.e., vacuum tube television replaced by digital technology. Societal factors can move in subtle, yet powerful, ways causing organizations to reevaluate customer groups, i.e., American women managing household finances, or aging baby boomers. Environmental factors are often beyond organizational control, yet can directly impact survival and success, i.e., businesses in New Orleans post Katrina. Interpreting and interfacing with external environmental forces and trends – and setting a direction for adaptation - is the responsibility of the senior executive leadership.

A persistent environmental trend affecting the NNC is the growing shortage of civilian nurses resulting in a shrinking pool of nurses to draw from and a pressure to raise civilian nursing wages. In a time of war, the political atmosphere can hinder or enhance recruiting efforts, including how civilian nurses perceive the war. Fulfilling one’s patriotic duty is basically a personal choice subject to an array of individual and societal forces. Connecting some of the dots demonstrates aspects of a

⁷⁴ Wikipedia Web Page, *Internet Dictionary: Input*, <http://en.wikipedia.org/wiki/Input>. (Accessed Nov 2006).

vicious cycle: a shortage of civilian nurses and uncertainty associated with the Iraq war causes increased strain on the nursing workforce, which translates into recruiting and retention shortfalls of military nurses. To save money, there are current and future plans to convert military nursing billets to civilian nursing jobs. Plus, there are ideas to combine all military medical assets from all services into one unified medical command.⁷⁵ One point is that to the extent that the NNC faces increasing environmental complexity and uncertainty, the harder it becomes to successfully intervene in a vicious cycle.

b. Key Success Factors

A generally accepted theme, or heuristic, in business and management circles is that what one can not measure, one can not assess. Key success factors are often industry specific and may appear straightforward (e.g., please the customer), yet can become ambiguous and conflicting, particularly in the public sector where the “bottom line” is often nebulous. Even in the private sector, American auto producers are evidently still wrestling with the interpretation and building of “quality” autos.

(1) Clear and Measurable Goals. It is generally accepted that clearly defined organizational goals are paramount for all employees to know how, where and when to apply their energy and resources. Setting goals is a common human method for progressing through life, and also a common method for organizations and institutions to move towards their desired results.

Rear Admiral Bruzek-Kohler, Director of the Navy Nurse Corps addressed the Senate Appropriations Committee May 3, 2006. She stated that the NNC has five major goals:⁷⁶

- Clinical proficiency to sustain our readiness
- Validation of Nurse Corps requirements and force shaping
- Match educational opportunities to requirements

⁷⁵ T. Philpott, *Unified Medical Command Gains September 08, 2006*, <http://www.military.com/features/0,15240,112706,00.html>, (Accessed Dec 2006).

⁷⁶ RDML C. Bruzek-Kohler, United States Senate Appropriations Committee, Subcommittee on Defense, *Navy Nurse Corps*. Washington: May 2006.

- Improved management and leadership development for mid-level Nurse Corps officers
- Formalized leadership continuum for senior Nurse Corps officers entering executive level positions

(2) Strong Leadership. An organization that has strong leadership is able to communicate the goals and future of an organization. Leadership throughout the organization works closely, almost as one unit, to show its support for the goals and direction of that organization.

One of the goals for the NNC is to enhance leadership at all levels. This is evidenced by the emphasis on leadership development for NNC officers at both the mid and senior levels of leadership. This would be an example of a goal that sounds good, but is difficult to measure. One metric might quantify the number of individuals receiving leadership training.

(3) Roles Clearly Defined. Individuals throughout the organization clearly understand their role in the organization and what they are held accountable to complete.

The NNC is focusing on requirements and force shaping in the 2006 goals. One question is to what extent does the plan to assess and define the requirements for the present and future NNC also define the track that a NNC officer must follow to progress through the ranks? Additionally, how will requirements be developed and explained to all members of the NNC as to what is the present and future focus of the NNC? A premise is that if NNC members can see the direction the NNC is moving towards, it will assist them in their individual career plans.

(4) Defined Plan of Execution. The organization has a well defined mission and vision that can be articulated by individuals throughout the organization.

Navy Medicine, and hundreds of other defense functions, are attempting to continually change and adapt to meet the overall medical needs of the Navy. The NNC mission has always been to deliver the best nursing care “whether the

patient is a wounded marine, an injured sailor, or a citizen who has lost their home in a disaster, Navy nurses have responded and deliver the finest care to our nation and the people of the world in their time of need.”⁷⁷ The plan of execution to meet the mission can be found in the strategic goals for 2006, listed earlier. This last success factor leads into the final input for discussion - system direction.

c. System Direction

Traditional ways to set organizational direction include stating mission, vision and guiding principals that many organizations post on their web sites or in their training pamphlets. Once a mission is defined, strategy and structure often follow. “*Strategy means to have a plan to steer a course of activities where the outcome can be controllable or engineered with monitoring, calibration for change in the unfavorable circumstances, seeing and fitting into the scheme of things - all and not in parts - make strategy.*”⁷⁸ A strategy is developed to align individual and group efforts toward meeting performance objectives or key success factors, which ideally translate into performance metrics. The theoretical guidance from systems theory shows that fit or alignment of variables extends across the entire system, i.e., the extent of congruence among pairs of variables, including an organizational structure (design) to accomplish a strategy would need to fit external forces and trends. When key variables are out of congruence, then a culture emerges that will likely not perform, i.e., if ways are not found to relieve nurse workplace stress, then the vicious cycle will likely continue, regardless of well-articulated mission, vision and values statements.

“The future success of the Navy Nurse Corps depends on our ability to clearly articulate our military relevance and alignment with the goals of the Navy and Navy Medicine.”⁷⁹ The NNC has articulated the five goals for 2006 to meet the overall needs of Navy Medicine. Next come the hard parts: implementation and evaluation. To summarize, NNC stated goals sound positive but may critically suffer in terms of ambiguity, implementation and evaluation. The executive leadership can definitely make

⁷⁷ RDML C. Bruzek-Kohler, *Navy Medicine News Letter Sept-Oct 2006*.

⁷⁸ Wikipedia Web Page, *Dictionary: Strategy*, <http://en.wikipedia.org/wiki/Strategy>, (Accessed Nov 2005).

⁷⁹ RDML C. Bruzek-Kohler, United States Senate Appropriations Committee, Subcommittee on Defense, *Navy Nurse Corps*. Washington: May 2006.

institutional changes, but the broadness of the goals will be hard to implement and track. In consonance with systems theory, cause and effect may also be far apart in time and space, which means that interventions often incur delays before consequences are felt

2. Design Factors (Throughputs)

The design factors, as depicted in Figure 7, are the throughputs of the model. This area describes:

- Tasks- what are the tasks, how are they different, how are they designed?
- Technology- what is the workflow, how are systems connected or communicating, what is the condition of the facilities or community?
- Structure- what is the organizational structure of the organization, how was the structure designed, what is the chain of command?
- People- who are the people, what are their skills, knowledge, abilities and attitude towards their assigned tasks?
- Process/subsystems- how is the organization designed for the day to day operations, what are the plans for future processes and how does the larger organization communicate with the subsystems of the organization?

a. Tasks

The tasks within an organization include all the work that must be completed by individuals, groups or machines to meet organizational goals. Ideally, tasks are well-designed (efficient), understood and crisply accomplished by the task recipient, and evaluated in terms of value-added. Maximum effectiveness can be obtained and maintained through clear task descriptions, training, and formalization/standardization of procedures to decrease variance.

CNO Guidance for 2006 -- Meeting the Challenge of a New Era: *Effects-Based Thinking (EBT)* -- *A relatively new but powerful planning concept, EBT requires us to begin each new task with the end state clearly in mind. It allows us to continually monitor progress against a discrete set of metrics, reallocating resources or effort as required to achieve concisely stated desired effects.*⁸⁰

⁸⁰ ADM M. G. MULLEN, CNO, *CNO Guidance for 2006 -- Meeting the Challenge of a New Era*, <http://www.navy.mil/features/2006CNOG.pdf>, (Accessed Nov 2006).

The overall task of the NNC is to stay aligned with the naval force. Broad guidance flows down from the Chief of Naval Operations (CNO) and the Bureau of Medicine (BUMED) which is translated into the aforementioned goals, which are ideally connected to identified results (outputs and outcomes). For example, as the NNC validates its requirements, it will assess the clinical and educational levels of the NNC today against the projected needs of overall Navy Medicine in the future. Although no one can predict the future, the idea would be to define the tasks that need to be done to accomplish future requirements, then adjust various design variables to achieve desired results, i.e., structural changes, rewards and incentives.

b. Technology

Once tasks are designed, work flow can be adjusted to fit emerging technology. Often in medicine, efficiencies can be accomplished by combining several tasks to be completed at once, or using processes designed to match the degree of interdependence needed, i.e., using teams for highly interdependent tasks, or computers for long-distance diagnosis. Of course, communication challenges can increase as technological complexity increases, as well as training and compensation factors.

Simply stated, NNC officers are inundated with continuously changing technology. There are continuous advancements in medical technology that NNC officers must understand and practice, often in real-time scenarios. Technological advances are integrated into the NNC through multiple venues, including schools, online and self-paced learning, and on the job events. A pervasive challenge to NNC leadership is how to understand and prioritize emerging technologies, including developing just-in-time procurement and training processes, and the subtle but crucial provision of individual motivation and incentives to use new technologies.

The results of a quick poll reported in December 2005 noted that red tape, lack of mentoring and low satisfaction with leadership were factors that influenced nurses to leave the Navy.⁸¹ Technology has both mitigated many of these problems and assisted in solving some of these problems. The use of email throughout many organizations has been both an effective tool for communication and perhaps a detriment for effective

⁸¹ G. Zangaros, *Data Analysis of Retention Factors*.
<https://wwwa.nko.navy.mil/portal/page?paId=page11924> (Accessed Dec 2005).

leadership. Common knowledge supports the dictum that an email sent is not an email necessarily read or understood. Often, administrators and managers are tempted to deal with a complex problem through a hastily-sent email, which may actually make things worse. Yet the use of the web page Navy Knowledge Online (NKO) appears to enhance the ability of members to acquire information and knowledge. One goal of NNC leadership might be to assess, implement and monitor communication technology to ensure simplicity and message continuity.

c. Structure

Organizational structure includes who reports to whom which is meant to clarify the formal decision-making route. Structure depicts the chain of command/hierarchy by which work and functions are divided, grouped, and coordinated. Structure can define how each unit and subunit is connected through a formalized network or matrix. The organization can be depicted in a chart, but structure in systems terms also refers to communication and decision-making structures. A chart typically does not depict the relationships among important groups and individuals which develop over time, i.e., power relationships among groups and individuals.

The structure of the NNC follows the traditional, military top-down hierarchy with the NNC being a sub-unit of the Bureau of Medicine and Surgery. In systems terms, the question is to what extent is the current structure obtaining desired results, and what structural changes are needed to facilitate adaptation?

d. People

“People/employees are our number one asset” (unknown author). This human resource statement is ubiquitous in current business and government literature. Obviously, people matter, but the real question often revolves around how much, i.e., people as assets or replaceable components? Of course, people also refer to how many, and what kinds of people work here? What are the demographics and skills needed for the future? What about motivation and incentives?

The NNC is comprised of 4500 active and reserve Nurse Corps officers.⁸² Table 1 depicts the subspecialty code that is assigned to a Nurse Corps officer after they have attained the required education or training.

e. Process/Subsystems

The area of process and subsystems encompasses four major areas:

(1) Financial Management, Measurement and Controls. The financial management and accountability portion of the system includes all monetary aspects of an organization to ensure financial solvency and compliance with all legal laws/guidelines. Organizational finances and budget often dictate what work, tasks and processes will be completed. The funding the NNC receives for manning is a relatively minor portion of the overall DoD budget, including the ability to increase pay or bonuses of navy nurses. Wages for all officers are set by the yearly DoD budget. This is a major difference to the civilian healthcare market that can adapt wages to meet their staffing needs.

(2) Human Resource Management (HRM). Human resource (HR) management includes academic theory and a business practice that addresses the theoretical and practical techniques of managing a workforce.⁸³ The HR function typically is involved with recruiting and hiring, including assessing the strategic, or future fit of employees to requirements. The processes of performance evaluation, compliance and training for workplace laws and regulations also fall under the HR domain.

This thesis includes the human resource environment of the NNC. The NNC is actively involved in the ongoing war in Iraq and other global operations, “recording over 60,000 days in support of and training for missions in operational units located in Kuwait, Iraq, Djibouti, Afghanistan, Bahrain, Qatar, Thailand, Indonesia, Sri Lanka, New Guinea, Pakistan, Guantanamo Bay, Cuba and along our own coast to provide assistance to Hurricanes Katrina and Rita Victims.”⁸⁴ Additionally, there is a

⁸² RDML C. Bruzek-Kohler, *Briefings to the Senate Appropriations Committee, Defense Subcommittee, Navy Nurse Corps*, May 3, 2006.

⁸³ Wikipedia Web Page, *Dictionary: Human Resource Management*, http://en.wikipedia.org/wiki/Human_Resource_Management, (Accessed Dec 2006).

⁸⁴ RDML C. Bruzek-Kohler, *United States Senate Appropriations Committee, Subcommittee on Defense, Navy Nurse Corps*. Washington: May 2006.

nursing shortage throughout the United States and internationally. The Nurse Corps' end strength is at its lowest level in 13 years.⁸⁵ The nursing inventory report shows that in 2006 the NNC will have lost over 11 percent of its corps. There have been some military to civilian conversions for nurses as the NNC re-evaluates its requirements. Plus, because of the attacks on 9/11, the President declared a state of national emergency and allowed the Secretary of Defense to implement several stop losses on the NNC where specific nursing subspecialties were experiencing shortages. These stop losses retained Navy nurses on active duty after their expected date of release from the service.

(3) Communication Information Planning and Decision Making. The point of this section is to highlight the communication and information system components relevant to organizational design. Information systems basically acquire, process, store and disseminate an array of data. Information security has emerged as a pivotal aspect of this complex endeavor. Additionally, modem speed, bandwidth, and near instantaneous global communications challenge all organizations to adapt. Communication managers are faced with the pervasive dilemma of providing decision-makers with all relevant knowledge without overloading/overwhelming both system and human capacity constraints.

The Navy has implemented a one-stop shopping web site at Navy Knowledge Online. The NNC has a webpage on this site that is a source of information for all nurses to access for updates to timely NNC issues. The site is also used for nurse collaboration in similar subspecialties. It is common knowledge that the richest form of communication for some exchanges is face to face. The quick poll completed by LCDR G. Zangaros found that communication between the Senior Nurse Executives (SNE) and the military nursing staff at the Military Treatment Facilities (MTF) was lacking.⁸⁶ One of the espoused goals for the NNC is to enhance mid-level leadership by involving senior leadership at all commands.

⁸⁵ G. Zangaros, *Data Analysis of Retention Factors*.
https://wwwa.nko.navy.mil/portal/page?paf_pageId=page11924 (Accessed Dec 2005).

⁸⁶ G. Zangaros, *Data Analysis of Retention Factors*.
https://wwwa.nko.navy.mil/portal/page?paf_pageId=page11924 (Accessed Dec 2005).

(4) Acquisition and Contracting. The area of acquisitions and contracting involves a great deal of planning for future needs and management of numerous contracts over many reporting periods. The area of contracting entails many rules and regulations that must be continuously monitored and explained to leadership. “The Air Force, Army, and Navy have converted or have plans to convert several thousand military health care positions to civilian positions and have made progress in hiring civilian replacement personnel. From 2005 through 2007, the Air Force, Army, and Navy collectively have converted or plan to convert a total of 5,507 military health care positions to civilian positions. Of the 5,507 military health care positions, the departments plan to convert 152 physician positions, **349 nurse positions**, and 208 dental positions to civilian positions.” The increase in contracted nursing positions is likely to increase workload at local commands by generating the need to recruit locally instead of being populated by NNC assigned officers.

3. Results

Organizational results are described in systems terms as multi-dimensional: culture is an emerging result, outputs include goods and services, and outcomes are the intended and unintended consequences of the outputs.

a. Culture

“Organizational culture is the specific collection of values and norms that are shared by people and groups in an organization and that control the way they interact with each other and with stakeholders outside the organization.”⁸⁷ Organizational culture runs deep and is often slow to change. The reason it is included in results is because it includes behaviors that emerge over time and this composite of behaviors tends to have a direct effect on organizational performance (outputs and outcomes). Of course, a strong culture can impede or enhance organizational performance, often depending on the extent to which the existing culture is producing desired results and fits the demands and expectations of the external environment. For example, a strongly masculine culture might resist the introduction of women and minorities into its ranks, even though it desperately needs the added personnel.

⁸⁷ C. Hill & G. Jones, *Strategic Management, Fifth Edition*. Houghton Mifflin: 2001.

The dominant culture of the NNC appears to be quite different than its civilian counterpart. All NNC officers have at least a baccalaureate degree. The average amount of time a military nurse has served as a nurse in the Navy is 3.6 years.⁸⁸ The gender mix is considerably different with males comprising 37 percent of the NNC, while males only make up 5.4 percent American registered nurses overall.^{89,90} As with some other military fields, the Navy is a great opportunity for a new nurse to acquire skills, which thereby makes them more marketable. Additionally, a large percentage of nurses are relatively young and unmarried, thereby facilitating easier job changes. Unfortunately, to the extent that there is a lack of attachment to the NNC, new nurses can more readily leave military service. Any strong culture possesses an esprit de corps where "morale is the capacity of a group of people to pull together persistently and consistently in pursuit of a common purpose to create common spirit of comradeship, enthusiasm, and devotion to a cause among the members of a group."⁹¹

b. Outputs

Organizational outputs can best be described in terms of goods and services, i.e., generally measurable items of production. Outputs can be described in terms of key success factors, or factors necessary for organizational success. An example of a Mobile Training Facility (MTF) output would be the number and quality of nurses produced in a time period.

c. Outcomes

Outcomes are consequences of the outputs, including intended and unintended consequences. Outcomes are the "so what" question following outputs, i.e., to what extent does producing a measured quantity of military nurses translate into improved healthcare for service members? Part of the difficulty surrounding the distinction between outputs and outcomes is that the former are easier to measure (and therefore tend to get measured), and the latter are harder to measure (but are often the

⁸⁸ G. Zangaros, *Data Analysis of Retention Factors*.
<https://wwwa.nko.navy.mil/portal/page?paId=page11924> (Accessed Dec 2005).

⁸⁹ Navy Nurse Corps Web Page, *Nurse Corps Lineal List 2008*,
https://wwwa.nko.navy.mil/portal/download?lib_documentId=929300010, (Accessed Jan 2007).

⁹⁰ All Nursing Schools Web Page, *Men in Nursing*, <http://www.allnursingschools.com/faqs/men.php>, (Accessed Jan 2007).

⁹¹ Wikipedia Web Page, *Dictionary: Esprit de Corps*, http://en.wikipedia.org/wiki/Military_tradition, (Accessed Jan 2007).

truest indicator of success). For example, the organization could emphasize quantity of new nurses over quality, thereby meeting recruiting goals, but possibly degrading capability to understand and implement new technologies. In sum, the espoused vision to promote, protect, and restore the health of all entrusted to the NNC's care anytime, anywhere, is an excellent intended outcome which may or may not materialize, based on the relative alignment of other system variables, i.e., ability to recruit and retain highly skilled and motivated nurses.

D. ORGANIZATIONAL CONFIGURATIONS

There are various definitions of organizational configuration found in the literature, i.e., a clustering of organizational attributes including strategies, structures, processes and external environmental factors.^{92,93,94}

The model selected to evaluate organizational configuration relevant to this study and depicted below was developed by Professor Nancy Roberts.⁹⁵ As mentioned earlier in the organizational systems model, the concept of configuration also refers to the interrelationships of multiple variables comprising a holistic view or pattern, i.e., the parts of an organization cannot really be understood in isolation. Although the model is broken up into four quadrants, organizations may position themselves along a continuum (hybrids) pursuing different (lesser) degrees of efficiency and effectiveness. The four configurations are meant to “simplify the management jungle of competing theories and models” and to raise essential questions for managers wrestling with efficiency and effectiveness dimensions.⁹⁶ The model is used to determine where an organization falls within the matrix based on their characteristics so they can better evaluate consistency across multiple dimensions of design and context, i.e., fit or congruence of the various components determines performance. Organizational leaders may believe they are being

⁹² D. Miller, “Strategy Making and Structure: Analysis and Implications for Performance,” *Academy of Management Journal* 30 (1987).

⁹³ D. Miller & H. Mintzberg, *Beyond Method: Strategies for Social Research*, Sage: 1983.

⁹⁴ H. Mintzberg, *Perspectives on Strategic Management*, Harper and Rowe: 1990.

⁹⁵ N. Roberts, “Organizational Configurations: Four Approaches to Public Management.” In *Advancing Public Management*. Eds. J. L. Brudney, L. O’Toole, and H.G. Rainey, Washington, D.C.: Georgetown University Press, 2000, 217-234.

⁹⁶ N. Roberts, “Organizational Configurations: Four Approaches to Public Management.” In *Advancing Public Management*. Eds. J. L. Brudney, L. O’Toole, and H.G. Rainey, Washington, D.C.: Georgetown University Press, 2000, 217-234.

both effective and efficient, but an objective evaluation often reveals the inherent tension or interference between these two terms, i.e., in reality, leaders are forced to make critical tradeoffs between the competing dimensions. This realization may help an organization conduct meaningful diagnosis, including attempting to balance the “creative tension” between current reality and a vision of a better future.⁹⁷

Each quadrant highlights multiple characteristics that help to define the four dimensions, including how components cluster together around particular conditions related to efficiency, effectiveness, and the extent to which stakeholders compete or collaborate. There are multiple definitions of efficiency and effectiveness so effectiveness can be defined as: “*The extent to which **actual** outcomes are achieved, in terms of the **planned** outcomes, via relevant outputs, programs or administered expenses. The effectiveness of an output or program should be distinguished from its efficiency, which concerns the adequacy of its administration.*”⁹⁸ Efficiency is defined as: “*The production of the **desired effects** or results with minimum waste of time, effort, or skill.*”⁹⁹

⁹⁷ P. Senge (1990). *The Fifth Discipline: The Art and Practice of the Learning Organization*. New York: Doubleday, 1990.

⁹⁸ Answers.com Web Page, *Dictionary: Effectiveness*, www.facs.gov.au/annualreport/2004/glossary.htm, (Accessed Dec 2006).

⁹⁹ Answers.com Web Page, *Dictionary: Efficiency*, www.facs.gov.au/annualreport/2004/glossary.htm, (Accessed Dec 2006).

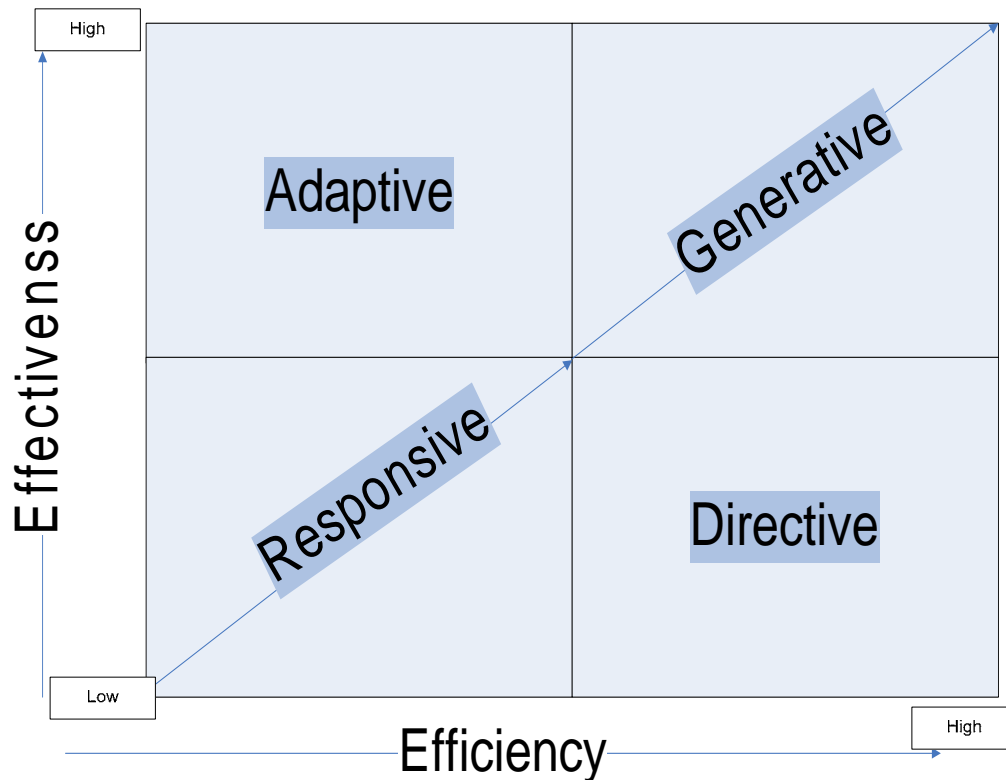


Figure 8. Organizational Configurations (From N. Roberts, “Organizational Configurations: Four Approaches to Public Management.” In *Advancing Public Management*. Eds. J. L. Brudney, L. O’Toole, and H.G. Rainey, Washington, D.C.: Georgetown University Press, 2000, 217-234)

1. Adaptive Configuration

“Adaptive configuration seeks to optimize organizational effectiveness, downplaying interests in efficiency.”¹⁰⁰ A research study completed by metagroup.com surveyed why an organization may want to become more adaptive, i.e., more effective than efficient. Figure 9 displays their results. The graphic also depicts the characteristics of an adaptive organization.

¹⁰⁰ N. Roberts, “Organizational Configurations: Four Approaches to Public Management.” In *Advancing Public Management*. Eds. J. L. Brudney, L. O’Toole, and H.G. Rainey, Washington, D.C.: Georgetown University Press, 2000, 217-234.

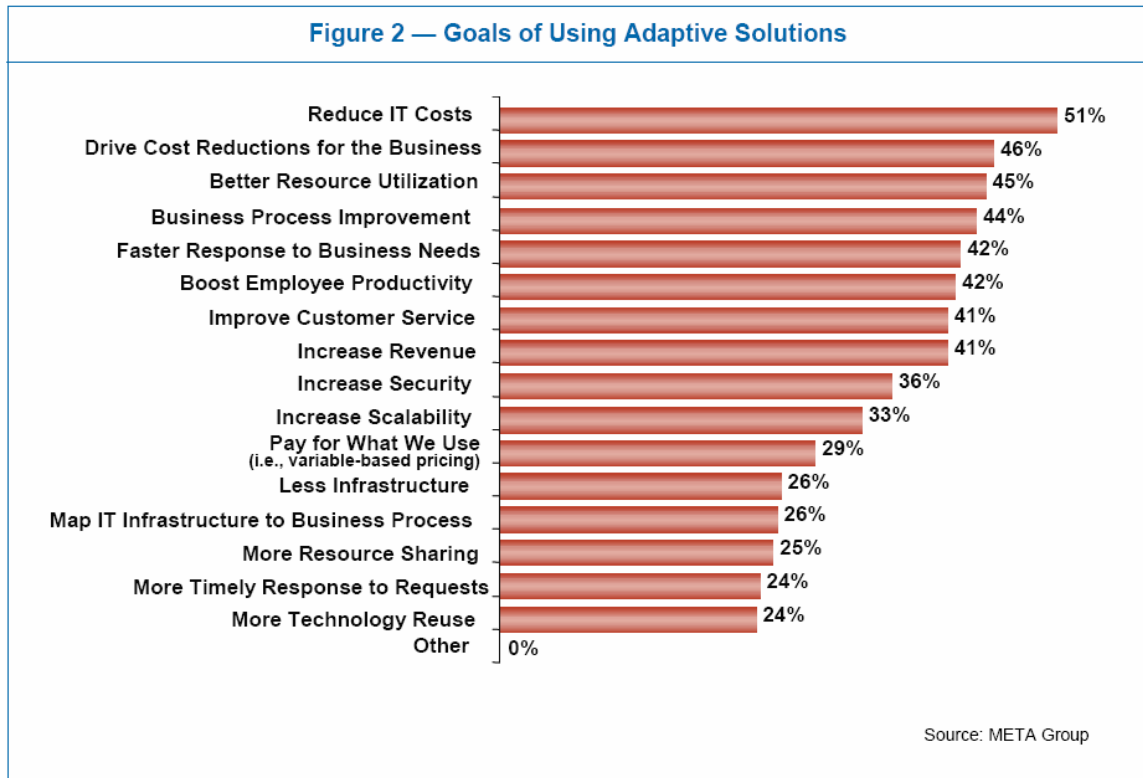


Figure 9. Goals of Using Adaptive Solutions (From Metagroup Web Page, *The Adaptive Organization: An Examination of On Demand Computing*, <http://h71028.www7.hp.com/enterprise/downloads/META%20Group%20Adaptive%20Organization%20Study%20Management%20Summary.pdf>, (Accessed Dec 2006).)

A primary consideration appears to center around the notion of flexibility. The premise is that the ability of an organization to anticipate and adapt to existing and changing environmental patterns in a timely manner, increases the probability of obtaining relevant goals and successful adaptation.

The Naval Nurse Corps (NNC) as a subsystem within the overarching defense system has a generally accepted history of a traditional machine bureaucracy¹⁰¹, markedly constrained and not prone to the innovation associated with adaptive firms. Of course, senior executives within the NNC can and do shape policy inching the *machine* towards a more adaptive mode, i.e., innovation, risk-taking and decentralized decision-making (Figure 8). One imposing reality that surfaced earlier concerning a persistent

¹⁰¹ Mintzberg, H.(1996a), "The Machine Organization." In *The Strategy Process*. Eds. H. Mintzberg and J.B. Quinn, Upper Saddle River, NJ: Prentice Hall, 1996.

nursing shortage means leaders are faced with the tradeoffs associated with increasing recruiting and retention while simultaneously reducing costs. In an adaptive configuration, the NNC is faced with the challenge of shifting decision-making down in the organizations to the actual worksites.

A fairly recent success story in corporate America is the Harley Davidson Company. The company was founded to provide motorcycles epitomizing part of the American creed of the individualistic rebel, free spirits with no boundaries. Over time the company shifted toward the machine bureaucracy quadrant defined as *directive*, i.e., rigid design, internal efficiency, and hierarchical assembly factories. To counter what Harley Davidson leaders perceived was the wrong direction; they started a program called Freedom with Fences which “describes the element of Harley-Davidson’s culture that encourages employees to take educated risks and to ‘push back’ during decision-making processes.”¹⁰² Senior executives were committed to greater innovation and creativity in all their business practices, e.g., an adaptive configuration. Even more recently, Harley Davidson has demonstrated attributes indicative of the much more challenging *generative* quadrant, i.e., a *learning* organization focused on stakeholder collaboration. All four quadrants have downsides. An obvious concern where research is thin, is how successful organizations continually change without sacrificing core expertise, and without confusing employees attempting to keep up with incessant change. The medical field is not immune, in fact, research conducted by Stanford Professor Jim Collins indicates that mediocre companies face “chronic restructuring, demonstrate chronic inconsistency – lurching back and forth – and run about like Chicken Little in reaction to technology change.”¹⁰³

2. Directive Configurations

In a directive organization, the chain of command and hierarchy can be depicted as more rigidly geared toward improving internal operations, including top-down decision making (reflective of a well-oiled machine). Managers “avoid issues of adaptation to the external environment that require reexamination of current operations.

¹⁰² Catalyst Web Page, Optimizing Talent: A Culture of Empowerment, <http://www.catalyst.org/award/04conference.shtml>, (Accessed Nov 2006).

¹⁰³ J. Collins, Good to Great: Why Some Companies Make the Leap and Others Don’t, New York: 2001.

Instead, they focus on maintaining internal order, thus attempting as much as possible to cut the organization off from any disruptive external influences.”¹⁰⁴ Most military organizations reflect this machine orientation through standardized, specialized and formalized tasks. A directive organization is not concerned with effectiveness but with improving its many activities. Change and risk are minimized, unless deemed essential. Controls and constraints characterize this quadrant as managers rely on rules, policies, standard operating procedures, and higher directives. A classic example used by Professor Roberts is a Navy aircraft carrier during peacetime operations practicing its procedures within a stable environment against a well-defined threat (Soviets pre-1990). Effectiveness on the other hand, lies within the domain of national security policy. Many aspects of a traditional (defense) health care system reflect the overarching goal of optimal efficiency. Important questions abound: efficiency at what cost, and how to adapt as the external environment becomes more turbulent? The medical field struggles with these questions, including the added moral burden of human lives at stake.

3. Responsive Configurations

As figure 8 shows, a responsive organization does not strive for either effectiveness or efficiency. Organizations in this quadrant live in a more reactive mode responding to competing stakeholders, each with separate and even conflicting goals and agendas. The Federal Emergency Management Agency (FEMA) and many other regulatory bodies reflect this mode, often being evaluated on how they are perceived by a pluralism of stakeholders. Regardless of organizational improvements, FEMA is perceived by many Americans as producing “inconsistent, disjointed patterns of activity in response to competing demands in the political environment”¹⁰⁵, i.e., post Hurricane Katrina debacle. Leaders in the responsive mode are often forced to choose between the two roles of “crisis manager” or “power broker.” Skill in political maneuvering becomes essential. Organizational policies are often the result of “partisan mutual adjustments made in response to competing demands in the political context.”¹⁰⁶

¹⁰⁴ N. Roberts, “Organizational Configurations: Four Approaches to Public Management.” In *Advancing Public Management*. Eds. J. L. Brudney, L. O’Toole, and H.G. Rainey, Washington, D.C.: Georgetown University Press, 2000, 217-234.

¹⁰⁵ Congressional Report, *Hurricane Katrina: A Nation Still Unprepared*, S. Rpt. 109-332, 2007.

¹⁰⁶ C.E. Lindholm (1959). “The Science of Muddling Through.” *Public Administration Review* 19 (1959): 79-88.

4. Generative Configurations

As Figure 8 shows, generative organizations strive to be both efficient and effective through the difficult and time-consuming process of stakeholder collaboration. The generative organization develops and maintains more of a networked structure, i.e., loosely coupled and decentralized. Executive leaders in this quadrant must be masters of paradox searching for ways to reconcile competing expectations: “short-run and long-run perspectives; global and local considerations; individual and collective needs; social and economic concerns; security and freedom; change and stability; diversity and commonality of purpose.”¹⁰⁷ Some organizations espouse their ability to create new solutions to old problems by empowering employees and encouraging collaboration, but “no one organization exists, as far as this researcher is aware, that exemplifies the generative configuration.”¹⁰⁸ Instead, there is evidence that some organizations display various generative aspects toward what is often referred to as the “new management paradigm.”¹⁰⁹ Again, Harley Davidson Motorcycle Corporation displays generative attributes, i.e., encouraging workers to explore, experiment and learns in new areas and to engage in meaningful dialogue with multiple stakeholders.

The point of understanding these four configurations is for leaders and managers to remember that the components of each ideal configuration “fit” together. Therefore, before undertaking substantial change projects, leaders and managers “would be advised to consider how well the anticipated changes fit with their organization’s current configuration.”¹¹⁰

¹⁰⁷ C. Handy, *The Age of Paradox*. Boston: Harvard Business School Press, 1995.

¹⁰⁸ N. Roberts, “Organizational Configurations: Four Approaches to Public Management.” In *Advancing Public Management*. Eds. J. L. Brudney, L. O’Toole, and H.G. Rainey, Washington, D.C.: Georgetown University Press, 2000, 217-234.

¹⁰⁹ A. Levine & J. Luck *The New Management Paradigm: A Review of Principles and Practices*, Rand Corporation MR-458-AF, 1994.

¹¹⁰ N. Roberts, “Organizational Configurations: Four Approaches to Public Management.” In *Advancing Public Management*. Eds. J. L. Brudney, L. O’Toole, and H.G. Rainey, Washington, D.C.: Georgetown University Press, 2000, 217-234.

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IV. DATA SOURCES, GENERAL METHODOLOGY AND VARIABLE DEFINITIONS

A. DATA SOURCES

This thesis focused on all Navy Nurse Corps officers who were on active duty anytime between 1990 and 2005. Data was obtained from two main sources, the Bureau of Medicine Information System (BUMIS) and the Defense Manpower Data Center (DMDC). The BUMIS database provided demographic information plus key dates and training codes while the DMDC database provided more demographic information and reserve affiliation information from the Active Duty Master File (ADMF) and the Reserve Components Common Personnel Data System (RCCPDS), respectively.

1. BUMIS Information

BUMIS provided an abundance of information regarding each person in the NNC from 1990 to 2005. The variables chosen as pertinent to this thesis included the nurse's gender, subspecialty, education level, gain category, loss category, unit identification code (UIC), activity name, date of birth, date of rank, active commissioning base date, active duty base date, pay entry base date, and expected loss date.

2. DMDC Information

Variables obtained from DMDC using the ADMF and the RCCPDS include race, ethnicity, marital status, and number of dependents, reserve component code, reserve service code, and reserve training code.

3. Combining of the Databases

The two databases were combined by Dennis Mar, a statistician at Naval Postgraduate School. The combining of the databases was accomplished by matching multiple variables such as name, date of birth, pay entry base date and UIC. Each nurse that was on active duty between 1990 and 2005 has an observation for each variable for each year they were active duty during that time period. Variables that were narrowed down to only one observation per nurse include gender, active commissioning base date, active duty base date, date of birth, gain category, loss category, pay entry base date, year group, race, ethnicity, marital status, dependents and all the reserve variables. Several

variables were left at one observation per year. These included subspecialty, education level, unit identification code, and activity name. The unit of observation is an individual officer.

B. GENERAL METHODOLOGY AND VARIABLE DEFINITIONS

1. Overview

This thesis seeks to answer two separate questions. First, what are the determinants of a nurse's decision to stay on active duty? Second, among those who leave active duty, what are the determinants of those nurses' decision to participate in the reserves? For the first question, we estimate an active duty retention model using all available data points. For the second question, we estimate a reserve affiliation rate model using only those who leave active duty. In both analyses, we utilize a logit model to account for the dichotomous nature of the dependent variables. We discuss the variables used in our analyses below. We leave the discussion of the actual empirical models to Chapter V.

2. Dependent Variable (STAY) for Active Duty Retention Regression

A nurse's initial obligation depends on their accession source and whether they received an accession bonus. With that being said, initial obligations are usually around four years. If the cut off for retention is at the four year mark, however, the number of people counted as stayers would be artificially high because nurses in their fourth year of duty are usually just beginning or in the middle of their second set of orders and are not eligible to make a retention decision until the end of their orders. Therefore, determining the exact point when each nurse was eligible to make their initial retention decision was impossible with the data available.

It was finally decided that nurses in year groups 2000 and beyond would be dropped from the database in order to observe at least six years of data for each nurse. This would allow every nurse to complete their initial obligation plus two tours. Then, stayers would be classified as those who did not have a leave date. "Leavers" would be those with leave dates who left due to resignation or release. Other nurses who were dropped from the regression included nurses who were classified as leaving the NNC due to file correction, death, changed designator or discharged for administrative, physical or other reasons. Only eleven nurses were in the category of file correction, death or change

of designator and, therefore, were considered special cases. Discharges, of which there were 367 observations, were dropped because it was difficult to determine whether these nurses were discharged by choice and, therefore, may have not had the chance to make a voluntary retention decision.

3. Dependent Variable (RESERVE) for Reserve Affiliation Regression

The second regression deals with whether a nurse who leaves active duty chooses to actively participate in the reserves. Actively participating is defined as being in a paid status while in the reserves. “Reservists in a pay status are called Selected Reservists (SELRES).”¹¹¹ Selected Reservists are comprised of Drilling Unit Reservists and Full-time Reserve Unit Support Personnel, which includes Full Time Support (FTS) personnel.¹¹² Personnel were also classified as participating reservists if they retired from the reserves or were Standby Reservist on active duty.

Nurses who choose not to actively participate are those who leave and have no reserve code or those who are in the Individual Ready Reserve (IRR). People in the IRR do not receive pay, are not obligated to drill and are only activated by Presidential Reserve Callup Authority.¹¹³ Nurses who are in the IRR are usually people who left active duty before their eight year obligation was fulfilled. They were then automatically assigned to the IRR until their obligation was completed.¹¹⁴

Any nurse who was still active duty or retired was exempt from this regression because they never made the choice to either affiliate with the reserves or become a civilian. Lastly, those recorded as being in the reserves under officer training were also exempt because these people were just starting their careers, not leaving active duty.

¹¹¹ United States Navy Web Page, *Naval Reserve Training*, <http://www.fas.org/man/dod-101/navy/docs/sftm/Ch1sec3.html>, (Accessed Jan 2007).

¹¹² Military.com Web Page, *Selected Reserve Composition*, www.military.com/Resources/ResourceFileView/Reserve_Selected_Composition.htm, (Accessed Jan 2007).

¹¹³ Wikipedia Web Page, *Individual Ready Reserve*, http://en.wikipedia.org/wiki/Individual_Ready_Reserve, (Accessed Jan 2007).

¹¹⁴ United States Navy Web Page, *Reserve Affiliation*, https://wwwa.nko.navy.mil/portal/download?lib_documentId=82207, (Accessed Jan 2007).

4. Explanatory Variables

Variables have been formulated to determine what factors may explain the decision of a NNC officer to stay on active service or leave active duty and affiliate with the reserves.

a. Demographic Variables

(1) Gender (MALE, FEMALE). As with most demographic statistics, gender was utilized as a binary variable. The variable is called “MALE” with the base case being female in this model. This is different than most military models, since females historically have not been a large section of the active military. In the NNC, however, females make up a majority of the population and are, thus, considered the base case.

Since the majority of the NNC has historically been populated by female officers, factors such as childbirth and homemaking play a larger role in retention for the NNC. On the other hand, there has been a steady increase in the number of male nurses compared to female nurses in the NNC over the past 10 years. The decrease in female NNC officers and the increase in male NNC officers would lead to the prediction that the effect of being male will be positive in the retention model.

When gender is assessed for the affiliation model, the hypothesized sign will remain the same. If females leave the active duty military for family and job opportunities, they will also not affiliate with the reserves. Males who leave the active service do not have the factor of childbirth to think about and there tends to be a higher affinity for males to feel a need to associate with the military after release from active service.

(2) Marital/Dependents Status (MWC, MNC, SWC, SNC). The variable MWC stands for someone who is married with children and describes a person who was married in their last observed year in the database and has at least one dependent who is not a spouse. The variable MNC stands for someone who is married with no children and describes a person who was married in their last observed year in the database and has no dependent other than a spouse. The variable SWC describes a person who was single in

their last observed year in the database and has at least one dependent. The base case is SNC which stands for being single with no children.

It can be argued that being married can both positively and negatively effect a person's decision to stay in the Navy. On one hand, the family must experience long deployments and constant moving. On the other hand, there are tremendous health benefits and job security. A single person would not hold the medical benefits in as high regard as a married person or even more so if that married person has children. A single person with children will be impacted more by deployments, but will still see the medical benefits and job security as a plus. Therefore nurses who are single with no children are surmised to leave at a higher rate than their married or single with children counterparts. Therefore, MNC, SWC, and MWC are all predicted to have a positive sign.

As was suggested in Waite's thesis in the literature review, being married may have the opposite effect on those deciding whether to affiliate with the reserves. Waite found that being married and having children negatively effected affiliation and so the predicted signs for MNC, SWC, and MWC in the affiliation model are negative.

(3) Race/Ethnicity (WHITE, BLACK, OTHER). The base case for race/ethnicity is WHITE. It is predicted that the sign for both BLACK and OTHER will be positive in both the retention and affiliation models because minorities are more likely to experience job stability and equal pay in the military as compared to civilian nursing.

b. Military Experience Variables

(1) Age at commissioning (COMMAGE). The commissioning age variable is the age of the NNC officer when they were commissioned and is calculated by subtracting their active commissioning base date from their date of birth. The hypothesized outcome of the COMMAGE variable would be positive because they are more likely to have been prior enlisted and because older people tend to plan for the long term, such as retirement. Therefore, whether the person is prior enlisted or not, the older the person, the more likely they are to stay in to obtain retirement benefits.

When COMMAGE is assessed in the reserve affiliation model, the hypothesized outcome would be positive for the same reason as in the retention model.

The NNC officer has already invested time towards retirement and they have already shown the propensity towards military life.

(2) Prior Enlistment (PRIOR). Determining whether a person was prior enlisted involved calculating the difference between the person's active commissioning base date and their pay entry base date. Those individuals who had a difference of over four years were considered to be prior enlisted. The four year mark was chosen in order to avoid incorrectly classifying NROTC accessions or Delayed Entry Program participants as prior enlisted. Plus, an officer only receives additional pay for their enlistment if they have served for over four years as an enlisted person.

The hypothesized sign for PRIOR will be positive in the both the reserve affiliation model and the retention model because prior enlisted people have already shown a desire to serve in the military and they have already invested over four years towards retirement.

c. Professional Variables

(1) Accession sources (DIRECT, NROTC, HSCP, NCCP, MECP, DIRECT_BONUS, and OTHER_GCAT). The base case for accession sources is via the direct method, where an already licensed nurse comes into the NNC. As was discussed in the literature review, other studies have found that nurses who are accessed through the MECP (Medical Enlisted Commissioning Program) program tend to retain better. It is hypothesized that this is because these people were prior enlisted and, therefore, have a vested interest in retiring from the military.

Nurses who were accessed through NROTC (Naval Reserve Officer Training Corps), HSCP (Health Services Collegiate Program), NCCP (Nurse Corps Commissioning Program), or other various gain categories were found to retain less than direct accessions and, therefore, their sign should be negative.¹¹⁵ Direct with bonus personnel are also hypothesized to have a negative sign because these nurses are being heavily fought for in both the military and civilian world. Therefore, they will take their military bonus and serve their minimum time and then get out and take the civilian bonus offered to these highly sought after skills.

¹¹⁵ T. Maeder, "The Costs and Benefits of the Navy Nurse Corps Accession Sources," (Monterey, California: Naval Postgraduate School, December 1999).

It is unclear how accession source will affect a nurse's decision to affiliate with the reserves. Therefore the expected sign could be positive or negative for any of the accession sources.

(2) Education level (POST_BA). The base case for this variable is a nurse who has a four year baccalaureate degree or less. Nurses will be considered to have a POST_BA if they have attained a Masters degree or PhD during their time in the database. The variable was calculated by capturing the highest degree the individual had annotated in the database. It is hypothesized that the longer a person serves in the military, the more likely they are to obtain a higher degree. Therefore, retention and reserve affiliation will both be positively correlated with POST_BA.

(3) The Big Three Hospitals – Naval Hospitals San Diego, Portsmouth, and Bethesda (SANDOG, PORT, BETH). These variables cover the three largest commands at which a NNC officer can be stationed. Each base case is that the nurse did NOT attend the particular hospital mentioned. If a nurse had been stationed at any of these three commands during their observed time in the database, they were categorized as a “1” in the appropriate hospital category. It is possible for a nurse to be categorized as a “1” in more than one of these hospital variables.

The NNC has suggested that any nurse seeking to make a career in the Navy should serve in at least one of these three hospitals (a large command) during their career. Therefore, the expected outcome for the three commands is that they will be positive in both models.

(4) Subspecialties (GEN_NURSE, MED_SURG, PSYCH, ER, OR, ADMIN, CRNA, OB_PEDS, CC_ICU). The last observed primary subspecialty code for each nurse was utilized to determine in which group a nurse would be categorized. General nurses are the base case because they make up a majority of the nurses in the database. The following table delineates how each subspecialty is grouped into large categories for this thesis.

Table 5. Subspecialty Categories of Nurses

Subspecialty Code	Subspecialty	Subspecialty Category
30	General Management	Administration
33	Manpower, Personnel, Training and Administration	Administration
36	Personnel Management	Administration
37	Education and Training Management	Administration
95	Computer Systems	Administration
934	Health Community Management	Administration
1806	Healthcare Management	Administration
1900	Professional Nursing	General Nurse
1901	Nursing Administration	Administration
1903	Nursing Education	Administration
1907	Health Services QA	Administration
1910	Medical/Surgical	Medical/Surgical
1911	Medical Nursing	General Nurse
1912	Surgical Nursing	General Nurse
1913	Cardiovascular	General Nurse
1916	Oncology Nursing	General Nurse
1920	Maternal Infant	Obstetrics/Pediatrics
1921	Obstetrics Nursing	Obstetrics/Pediatrics
1922	Pediatric Nursing	Obstetrics/Pediatrics
1923	Newborn Nursing	Obstetrics/Pediatrics
1930	Psychiatric Nursing	Psychiatric Nursing
1935	Orthopedic Nursing	Medical/Surgical
1940	Community Health	Obstetrics/Pediatrics
1945	ER/Trauma Nursing	Emergency Room
1950	Perioperative Nursing	Operating Room
1960	Critical Care Nursing	Critical Care/Intensive Care Unit
1961	Surgical ICU	Critical Care/Intensive Care Unit
1962	Medical ICU	Critical Care/Intensive Care Unit
1963	Critical Care Unit	Critical Care/Intensive Care Unit
1964	Neonatal ICU	Critical Care/Intensive Care Unit
1968	Post Anesthesia	Critical Care/Intensive Care Unit
1972	Nurse Anesthesia	Certified Registered Nurse Anesthetist
1974	Pediatric Nurse Practitioner	Obstetrics/Pediatrics
1975	Adult Health	Administration
1976	Family Nurse Practitioner	Obstetrics/Pediatrics
1980	Women's Health Nurse Practitioner	Obstetrics/Pediatrics
1981	Nurse Midwife	Obstetrics/Pediatrics
3130	Manpower, Personnel, Training and Administration	Administration
3150	Education and Training Management	Administration

All subspecialty groups are hypothesized to positively affect both retention and affiliation with the reserves. This is because a nurse who stays in long enough to obtain a specialty in nursing will have had a longer time in the military and, therefore, a more vested interest in military retirement.

(5) Combined Year Groups (YRGRP85_90, YRGRP90_95, YRGRP95_99). The final variables to be added into the models were time dummies. These time dummies consisted of grouping people into four different categories, according to their year group. The base case is any nurse whose year group is prior to 1985.

The hypothesized sign for all three time dummies is negative for both the retention and affiliation models. There are several reasons for this hypothesis. Firstly, as was cited in the literature review, civilian nursing has been experiencing an ever increasing shortage of nurses and, therefore, would attract more and more nurses away from the military. Secondly, there have been numerous conflicts since 1985 that may have increased the operational tempo of Navy nurses and enticed them to leave the Navy. Such conflicts include Operation Just Cause in 1990 (Panama), Operation Desert Storm in 1991 (Iraq), and Operation Uphold Democracy in 1993 (Haiti).¹¹⁶

Table 6 lists the expected sign for each variable in both the active retention model and the reserve affiliation model.

Table 6. Explanatory Variables and Expected Signs

Variable Name	Variable Type	Expected sign Stay	Expected Sign Reserve
Demographic			
Gender			
FEMALE	Dichotomous	Base Case	Base Case
MALE	Dichotomous	+	+
Marital Status			
Single no children	Dichotomous	Base Case	Base Case
Married With Children	Dichotomous	+	-
Married No Children	Dichotomous	+	-

¹¹⁶ Wikipedia Web Page, *List of United States Military History Events*, http://en.wikipedia.org/wiki/List_of_United_States_military_history_events#1980-1990, (Accessed Jan 2007).

Single With Children	Dichotomous	+	-
Race/Ethnicity			
White	Dichotomous	Base Case	Base Case
BLACK	Dichotomous	+	+
OTHER	Dichotomous	+	+
Military Experience			
Age at commissioning			
COMMAGE	Continuous	+	+
Prior Enlistment			
NOT PRIOR ENLISTED	Dichotomous	Base Case	Base Case
PRIOR ENLISTED	Dichotomous	+	+
Professional			
Accession Source			
DIRECT	Dichotomous	Base Case	Base Case
NROTC	Dichotomous	-	+/-
HSCP	Dichotomous	-	+/-
NCCP	Dichotomous	-	+/-
MECP	Dichotomous	+	+/-
DIRECT_BONUS	Dichotomous	-	+/-
OTHER_GCAT	Dichotomous	-	+/-
Education level			
BACCALAUREATE OR LESS	Dichotomous	Base Case	Base Case
POST GRADUATE DEGREE	Dichotomous	+	+
Big Three Medical Commands			
DID NOT ATTEND	Dichotomous	Base Case	Base Case
SANDOG	Dichotomous	+	+
PORT	Dichotomous	+	+
BETH	Dichotomous	+	+
Subspecialties			
GENERAL NURSE	Dichotomous	Base Case	Base Case
MED_SURG	Dichotomous	+	+
PSYCH	Dichotomous	+	+
ER	Dichotomous	+	+
OR	Dichotomous	+	+
ADMIN	Dichotomous	+	+
CRNA	Dichotomous	+	+
OB_PEDS	Dichotomous	+	+
CC_ICU	Dichotomous	+	+
Combined Year Groups			
YEAR GROUP PRIOR TO 1985	Dichotomous	Base Case	Base Case
YRGRP85_89	Dichotomous	-	-
YRGRP90_94	Dichotomous	-	-
YRGRP95_99	Dichotomous	-	-

V. DESCRIPTIVE DATA ANALYSIS AND ANALYTICAL METHOD

A. PRELIMINARY DATA ANALYSIS

This section will discuss the general descriptive statistics of nurses within the active retention model and the reserve affiliation model.

1. Descriptive Statistics of Officers Included in the Active Retention Model

This model contained 5,516 observations with 3,487 nurses staying and 2,029 nurses leaving. Table 7 provides summary statistics of the variables used in the regression for the entire group, as well as separate summary statistics for the “stayers” and the “leavers.”

Table 7. Characteristics of Navy Nurse Corps Officers Eligible to Make a Retention Decision

Characteristics	All N=5516	Stayers N=3487	Leavers N=2029
Stayers (%)	63.22%	100.00%	0.00%
Demographic			
Gender (%)			
Male ***	28.64%	37.17%	14.00%
Female	71.36%	62.83%	86.00%
Marital/Dependency Status(%)			
Married With Children ***	40.08%	48.67%	25.33%
Married No Children	25.36%	22.00%	31.15%
Single With Children ***	8.41%	8.75%	7.84%
Single No Children	26.14%	20.59%	35.68%
Race/Ethnicity(%)			
White	84.28%	83.65%	85.36%
Black ***	6.69%	7.23%	5.77%
Other ***	8.99%	9.06%	8.87%
Military Experience			
Age at Commissioning (Mean) *	27.37	27.80	26.63
Prior Enlistment (%)			
Not Prior Enlisted	78.61%	70.12%	93.20%
Prior Enlisted ***	21.39%	29.88%	6.80%
Professional			
Accession Source (%)			
Direct	46.81%	53.46%	35.39%
NROTC ***	6.85%	4.85%	10.30%
HSCP **	14.20%	9.09%	22.97%

NCCP *	4.06%	3.87%	4.39%
MECP ***	8.94%	13.22%	1.58%
Direct with Bonus ***	11.89%	9.03%	16.81%
Other Gain Category ***	7.25%	6.48%	8.58%
Education Level (%)			
Baccalaureate or Less	66.39%	51.19%	92.51%
Post Graduate Degree ***	33.61%	48.81%	7.49%
Big Three Medical Commands (%)			
Did NOT Attend NH San Diego	78.68%	80.61%	75.36%
Did Attend NH San Diego	21.32%	19.39%	24.64%
Did NOT Attend NH Portsmouth	80.58%	78.26%	84.57%
Did Attend NH Portsmouth ***	19.42%	21.74%	15.43%
Did NOT Attend NH Bethesda	96.12%	96.13%	96.11%
Did Attend NH Bethesda	3.88%	3.87%	3.89%
Subspecialties (%)			
General Nurse	26.65%	15.69%	45.49%
Medical/Surgical ***	8.56%	10.18%	5.77%
Psychology *	2.21%	2.24%	2.17%
Emergency Room ***	5.38%	5.71%	4.83%
Operating Room ***	9.90%	11.53%	7.10%
Administration ***	12.47%	18.76%	1.68%
Nurse Anesthetist	6.94%	8.80%	3.75%
OB/Pediatrics ***	16.93%	19.33%	12.81%
Critical Care/ICU ***	10.95%	7.77%	16.41%
Combined Year Groups (%)			
Prior to 1985	29.06%	41.10%	8.38%
1985-1989 ***	21.92%	16.23%	31.69%
1990-1994 ***	25.96%	19.13%	37.70%
1995-1999 ***	23.06%	23.54%	22.23%

*** ChiSq significant at .01 level when comparing stayers to leavers in the active retention model

** ChiSq significant at .05 level

* ChiSq significant at .10 level

Most of the nurses in the retention model are female (71.36 percent), white (84.28 percent), married with children (40.08 percent), not prior enlisted (78.61 percent), direct accession (46.81 percent) with a baccalaureate degree or less (66.39 percent). They are general nurses (26.65 percent) who have not attended one of the big three hospitals (approximately 80 percent) and are in a year group prior to 1985 (29.06 percent).

Table 8 shows the retention rates of these 5,516 nurses by characteristic. Males, at 82.03 percent, have a higher retention rate than females, at 55.67 percent. Nurses who are married with children have the highest retention rate of all the marital/dependency status

categories at 76.75 percent. Blacks have the highest ethnic retention rate of 68.29 percent. Prior enlisted nurses, at 88.31 percent, retain better than those who are not prior enlisted, at 56.39 percent. Nurses who enter the NNC through MECP have the highest retention rate of all accession sources, an impressive 93.51 percent. Direct accessions have the second highest retention rate of 72.19 percent. Nurses who have a postgraduate degree retain at 91.80 percent versus those who do not at 48.74 percent. Only Naval Hospital Portsmouth shows a higher retention rate for those who attended the hospital (70.77 percent) versus those who did not attend the hospital (61.39 percent). Nurses who have an administration subspecialty have the highest retention rate of 95.06 percent. The second highest retention rate is 80.16 percent for nurse anesthetists. General nurses have the lowest retention rate of 37.21 percent.

Table 8. Retention Rates by Characteristic

Characteristics	Continuation Rate
Stayers (%)	63.22%
Demographic	
Gender (%)	
Male ***	82.03%
Female	55.67%
Marital/Dependency Status(%)	
Married With Children ***	76.75%
Married No Children	54.82%
Single With Children ***	65.73%
Single No Children	49.79%
Race/Ethnicity(%)	
White	62.74%
Black ***	68.29%
Other ***	63.71%
Military Experience	
Age at Commissioning (Mean) *	N/A
Prior Enlistment (%)	
Not Prior Enlisted	56.39%
Prior Enlisted ***	88.31%
Professional	
Accession Source (%)	
Direct	72.19%
NROTC ***	44.71%
HSCP **	40.49%
NCCP *	60.27%

MECP ***	93.51%
Direct with Bonus ***	48.02%
Other Gain Category ***	56.50%
Education Level (%)	
Baccalaureate or Less	48.74%
Post Graduate Degree ***	91.80%
Big Three Medical Commands (%)	
Did NOT Attend NH San Diego	64.77%
Did Attend NH San Diego	57.48%
Did NOT Attend NH Portsmouth	61.39%
Did Attend NH Portsmouth ***	70.77%
Did NOT Attend NH Bethesda	63.22%
Did Attend NH Bethesda	63.08%
Subspecialties (%)	
General Nurse	37.21%
Medical/Surgical ***	75.21%
Psychology *	63.93%
Emergency Room ***	67.00%
Operating Room ***	73.63%
Administration ***	95.06%
Nurse Anesthetist	80.16%
OB/Pediatrics ***	72.16%
Critical Care/ICU ***	44.87%
Combined Year Groups (%)	
Prior to 1985	89.39%
1985-1989 ***	46.82%
1990-1994 ***	46.58%
1995-1999 ***	64.54%

*** ChiSq significant at .01 level when comparing stayers to leavers in the active retention model

** ChiSq significant at .05 level

* ChiSq significant at .10 level

Figure 10 also shows how the distribution of gender has changed in the Navy Nurse Corps over time. In the 1960's and again in the late 1980's, females made up a significant portion of the NNC. But, as time progresses, it appears that males are close to becoming the majority of the NNC. Figure 11 shows the change in distribution of ethnicities over time. As time progresses, Blacks and other minorities are comprising more and more of the NNC.

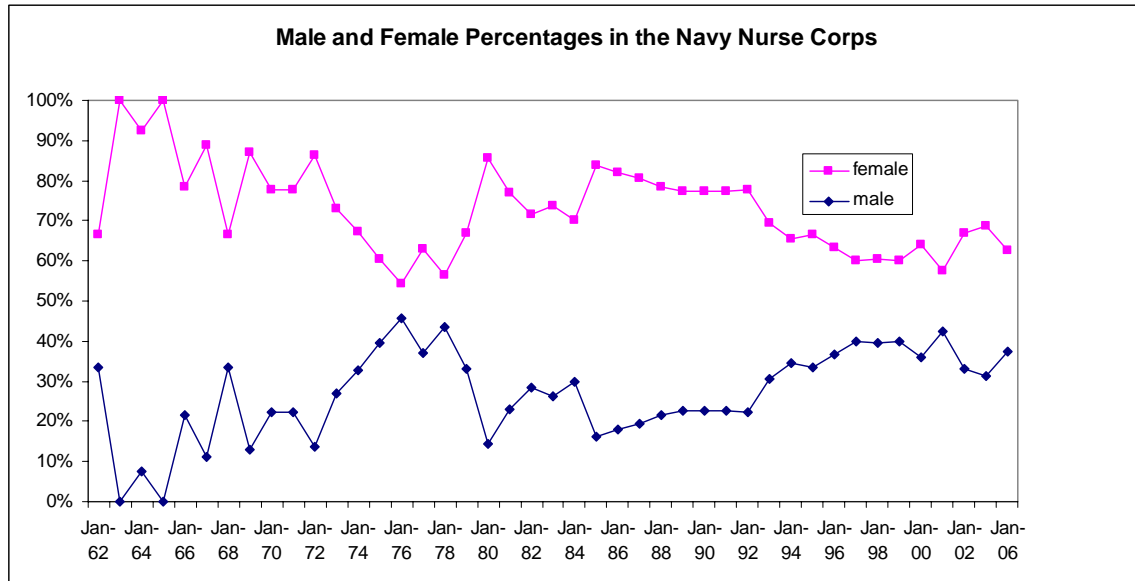


Figure 10. Male and Female Percentages in the Navy Nurse Corps

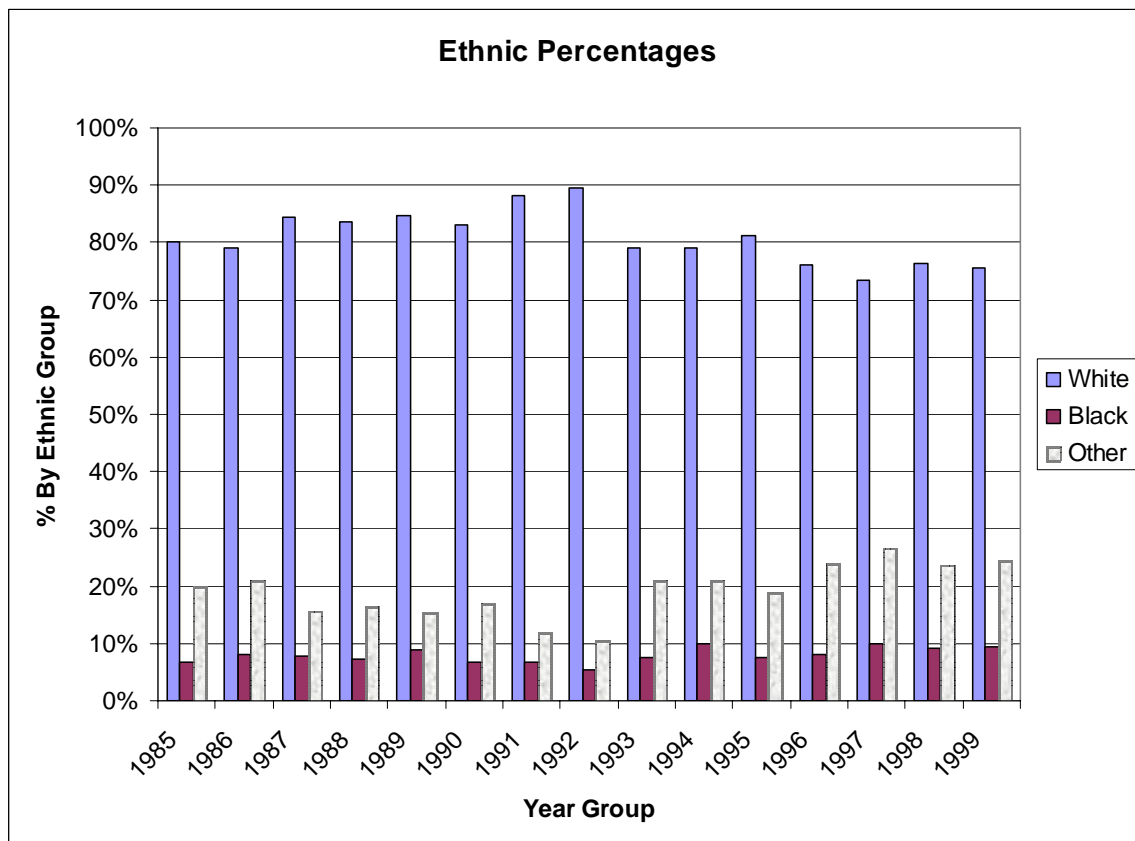


Figure 11. Ethnic Distribution of the Navy Nurse Corps By Year Group

2. Reserve Affiliation Model

The Reserve affiliation model includes those nurses who left active duty. This model contained 1,421 nurses, of whom 412 affiliated with the reserve. Table 9 shows the summary statistics for the entire group, as well as separate summary statistics for the people who are affiliated with the reserves and those who exit the military services completely.

Table 9. Characteristics of Navy Nurse Corps Officers Eligible to Make a Reserve Affiliation Decision

Characteristics	All N=1421	Yes Affiliation N=412	No Affiliation N=1009
Affiliates (%)	28.99%	100.00%	0.00%
Demographic			
Gender (%)			
Male	15.06%	18.45%	13.68%
Female	84.94%	81.55%	86.32%
Marital/Dependency Status(%)			
Married With Children	24.98%	29.37%	23.19%
Married No Children	31.39%	27.67%	32.90%
Single With Children	8.59%	8.98%	8.42%
Single No Children	35.05%	33.98%	35.48%
Race/Ethnicity(%)			
White	84.87%	83.98%	85.23%
Black	5.35%	4.61%	5.65%
Other	9.78%	11.41%	9.12%
Military Experience			
Age at Commissioning (Mean) **	26.70	28.17	26.09
Prior Enlistment (%)			
Not Prior Enlisted	93.17%	89.56%	94.65%
Prior Enlisted ***	6.83%	10.44%	5.35%
Professional			
Accession Source (%)			
Direct	33.43%	35.68%	32.51%
NROTC	12.81%	6.55%	15.36%
HSCP	20.27%	19.90%	20.42%
NCCP	4.86%	2.18%	5.95%
MECP	1.34%	0.97%	1.49%
Direct with Bonus	17.80%	15.78%	18.63%
Other Gain Category ***	9.50%	18.93%	5.65%
Education Level (%)			
Baccalaureate or Less	91.27%	87.62%	92.77%
Post Graduate Degree	8.73%	12.38%	7.23%
Big Three Medical Commands (%)			

Did NOT Attend NH San Diego	74.45%	74.27%	74.53%
Did Attend NH San Diego	25.55%	25.73%	25.47%
Did NOT Attend NH Portsmouth	83.39%	83.25%	83.45%
Did Attend NH Portsmouth	16.61%	16.75%	16.55%
Did NOT Attend NH Bethesda	96.06%	96.36%	95.94%
Did Attend NH Bethesda	3.94%	3.64%	4.06%
Subspecialties (%)			
General Nurse	44.76%	30.34%	50.64%
Medical/Surgical	5.77%	5.10%	6.05%
Psychology	2.11%	2.43%	1.98%
Emergency Room ***	4.86%	6.55%	4.16%
Operating Room ***	7.18%	12.62%	4.96%
Administration *	1.83%	2.91%	1.39%
Nurse Anesthetist	4.50%	6.07%	3.87%
OB/Pediatrics **	13.16%	15.29%	12.29%
Critical Care/ICU ***	15.83%	18.69%	14.67%
Combined Year Groups (%)			
Prior to 1985	8.37%	16.02%	5.25%
1985-1990 ***	29.63%	32.77%	28.34%
1990-1994 ***	35.12%	34.47%	35.38%
1995-1999 ***	26.88%	16.75%	31.02%

*** ChiSq significant at .01 level for comparison between affiliated and nonaffiliated officers in reserve model

** ChiSq significant at .05 level

* ChiSq significant at .10 level

Most of the nurses in the affiliation model are, again, female (84.94 percent), white (84.87 percent), not prior enlisted (93.17 percent), direct accession (33.43 percent) with a baccalaureate degree or less (91.27 percent). They are also general nurses (44.76 percent) who have not attended one of the big three hospitals (approximately 80 percent). Some key differences between this model and the retention model are that most of these nurses are single with no children (35.05 percent) vice married with children (24.98 percent) and most are from year groups 1990 to 1994 (35.12 percent) vice pre-1985 (8.37 percent).

Table 10 shows the affiliation rates of the nurses by characteristic. Males, at 35.51 percent, have a higher affiliation rate than females, at 27.84 percent. Nurses who are married with children have the highest affiliation rate of all the marital/dependency status categories at 34.08 percent. Other minorities have the highest ethnic affiliation rate of 33.81 percent. Prior enlisted nurses, at 44.33 percent, affiliate at a higher rate than those

who are not prior enlisted, at 27.87 percent. Nurses who enter the NNC through other gain categories have the highest affiliation rate of all accession sources, 57.78 percent. Direct accessions have the second highest affiliation rate of 30.95 percent. Nurses who have a postgraduate degree affiliate at 41.13 percent versus those who do not at 27.83 percent. Affiliation rates between nurses who do or do not attend any of the big three hospitals do not differ. Nurses who have an operating room subspecialty have the highest affiliation rate of 50.98 percent. The second highest affiliation rate is 46.15 percent for administrators. General nurses have the lowest affiliation rate of 19.65 percent.

Table 10. Reserve Affiliation Rates by Characteristic

Characteristics	Affiliation Rate
Affiliates (%)	28.99%
Demographic	
Gender (%)	
Male	35.51%
Female	27.84%
Marital/Dependency Status(%)	
Married With Children	34.08%
Married No Children	25.56%
Single With Children	30.33%
Single No Children	28.11%
Race/Ethnicity(%)	
White	28.69%
Black	25.00%
Other	33.81%
Military Experience	
Age at Commissioning (Mean) **	N/A
Prior Enlistment (%)	
Not Prior Enlisted	27.87%
Prior Enlisted ***	44.33%
Professional	
Accession Source (%)	
Direct	30.95%
NROTC	14.84%
HSCP	28.47%
NCCP	13.04%
MECP	21.05%
Direct with Bonus	25.69%
Other Gain Category ***	57.78%
Education Level (%)	
Baccalaureate or Less	27.83%
Post Graduate Degree	41.13%

Big Three Medical Commands (%)	
Did NOT Attend NH San Diego	28.92%
Did Attend NH San Diego	29.20%
Did NOT Attend NH Portsmouth	28.95%
Did Attend NH Portsmouth	29.24%
Did NOT Attend NH Bethesda	29.08%
Did Attend NH Bethesda	26.79%
Subspecialties (%)	
General Nurse	19.65%
Medical/Surgical	25.61%
Psychology	33.33%
Emergency Room ***	39.13%
Operating Room ***	50.98%
Administration *	46.15%
Nurse Anesthetist	39.06%
OB/Pediatrics **	33.69%
Critical Care/ICU ***	34.22%
Combined Year Groups (%)	
Prior to 1985	55.46%
1985-1990 ***	32.07%
1990-1994 ***	28.46%
1995-1999 ***	18.06%

*** ChiSq significant at .01 level for comparison between affiliated and non-affiliated officers in reserve model

** ChiSq significant at .05 level

* ChiSq significant at .10 level

B. ANALYTICAL METHOD

1. Theoretical Model

Both the retention and affiliation models contain dependent variables which are binary, meaning they take on values of 1 or 0. One of the main ways in which a regression analysis can be performed with a binary dependent variable is to perform a logit regression. In a logit model, the log of the odds of the dependent variables is reported. For the retention model, stay equals 1 and leave equals 0. For the Reserve affiliation model, affiliating equals 1 and not affiliating equals 0. The theoretical model is:

$$Li = \ln (Pi/1-Pi) = \alpha + \beta xi$$

where:

Li = log of odds ratio

Pi = Probability of retention or reserve affiliation, given the personal attributes xi

α = Intercept parameter

β = Vector of slope parameters

xi = Vector of explanatory variables

2. Multivariate Logit Regression Models

This section describes the empirical models used for both the retention and reserve affiliation regressions. The empirical model used to analyze both the probabilities of nurses staying active duty and the probability of nurses affiliating with the reserves is:

$$\ln (P_i/1-P_i) = \beta_0 + \beta_1(\text{MALE}) + \beta_2(\text{MWC}) + \beta_3(\text{MNC}) + \beta_4(\text{SWC}) + \beta_5(\text{COMM_AGE}) + \beta_6(\text{PRIOR}) + \beta_7(\text{BLACK}) + \beta_8(\text{OTHER}) + \beta_9(\text{NROTC}) + \beta_{10}(\text{HSCP}) + \beta_{11}(\text{NCCP}) + \beta_{12}(\text{MECP}) + \beta_{13}(\text{DIRECT_BONUS}) + \beta_{14}(\text{OTHER_GCAT}) + \beta_{15}(\text{POST_BA}) + \beta_{16}(\text{SANDOG}) + \beta_{17}(\text{PORT}) + \beta_{18}(\text{BETH}) + \beta_{19}(\text{MED_SURG}) + \beta_{20}(\text{PSYCH}) + \beta_{21}(\text{ER}) + \beta_{22}(\text{OR}) + \beta_{23}(\text{ADMIN}) + \beta_{24}(\text{CRNA}) + \beta_{25}(\text{OB_PEDS}) + \beta_{26}(\text{CC_ICU}) + \beta_{27}(\text{YRGRP85_89}) + \beta_{28}(\text{YRGRP90_94}) + \beta_{29}(\text{YRGRP95_99})$$

where:

MALE = being male

MWC = being married with dependents

MNC = being married without dependents

SWC = being single with dependents

COMM_AGE = age at which the person was commissioned

PRIOR = being prior enlisted

BLACK = being African-American

OTHER = being any race other than white or African-American

NROTC = accession source was the Naval Reserve Officer Training Corps

HSCP = accession source was the Health Services Commissioning Program

NCCP = accession source was the Nurse Corps Commissioning Program

MECP = accession source was the Medical Enlisted Commissioning Program

DIRECT_BONUS = accession source was direct with a bonus

OTHER_GCAT = accession source was something other than those listed above

POST_BA = having a postgraduate degree

SANDOG = attended NH San Diego during their career

PORT = attended NH Portsmouth during their career

BETH = attended NH Bethesda during their career

MED_SURG = having a Medical/Surgical subspecialty

PSYCH = having a Psychology subspecialty

ER = having an Emergency Room subspecialty

OR = having an Operating Room subspecialty
ADMIN = having an Administration subspecialty
CRNA = having a Nurse Anesthetist subspecialty
OB_PEDS = having an Obstetrics/Pediatrics subspecialty
CC_ICU = having a Critical Care/Intensive Care Unit subspecialty
YRGRP85_89 = year group is between 1985 and 1989
YRGRP90_94 = year group is between 1990 and 1994
YRGRP95_99 = year group is between 1995 and 1999

Only the sign of the parameter estimates can be used for interpretation in the models. The sign of the parameter estimate indicates whether a particular variable will increase or decrease the probability of retaining or affiliating. The Chi-square statistic reported along with the parameter estimate is calculated by dividing the parameter estimate by its standard error and squaring the result. The probability of the Chi-square statistic being exceeded through random chance is then calculated and reported. This probability is used to determine whether a variable is significant or not and at what level.

Partial effects are determined by first calculating the probability of a notional person retaining or affiliating, depending on the model being used. The notional person in both models is female, single with no children, white, 27.3 years old at commissioning, not prior enlisted, a direct accession, holds a baccalaureate or less, never attended any of the big three hospitals, is a general nurse and from a year group prior to 1985. Then each variable is changed incrementally and the probability of retaining or affiliating is again calculated. The difference in probabilities is called the partial effect. The partial effect divided by the original probability is the percent change in probability of that person retaining or affiliating compared to the notional person.

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VI. RESULTS OF THE ANALYSIS

A. OVERVIEW

The empirical analyses of this thesis examine determinants of retention in the active Navy Nurse Corps and affiliation with the reserves. This section discusses the results of logit regressions for the active duty retention model and the reserve affiliation model. Analysis includes the general fit of the models, significance of parameter estimates and interpretation of partial effects.

B. ACTIVE NAVY NURSE CORPS RETENTION MODEL

1. Logit Regression Model

The retention model contained 5,516 observations and 29 variables, 25 of which are significant. Table 11 shows the parameter estimate and the level of significance for each variable, plus the goodness of fit measurements for the entire model. All levels of significance are shown as one-tailed tests.

Table 11. Logit Regression Results for Retention Model, N=5516

Variable	Parameter Estimate	Pr>ChiSq
Male ***	0.7833	<0.0001
Married With Children ***	0.5623	<0.0001
Married No Children	-0.0111	0.4585
Single With Children ***	0.4103	0.0030
Age at Commissioning *	0.0130	0.0855
Prior Enlisted ***	1.4014	<0.0001
Black ***	0.4291	0.0035
Other ***	0.3620	0.0030
NROTC ***	-0.8444	<0.0001
HSCP **	-0.3248	0.0335
NCCP *	-0.2844	0.0975
MECP ***	0.9437	<0.0001
Direct with Bonus ***	-0.5163	0.0005
Other Gain Category ***	-1.5183	<0.0001
Post Graduate Degree ***	2.8484	<0.0001
Did Attend NH San Diego	-0.0288	0.3865
Did Attend NH Portsmouth ***	0.4214	<0.0001
Did Attend NH Bethesda	0.1447	0.2575
Medical/Surgical ***	1.5723	<0.0001
Psychology *	0.5455	0.0215
Emergency Room ***	1.1679	<0.0001
Operating Room ***	1.3064	<0.0001

Administration ***	1.9712	<0.0001
Nurse Anesthetist	0.0998	0.2855
OB/Pediatrics ***	1.1131	<0.0001
Critical Care/ICU ***	0.3488	0.0035
1985-1989 ***	-2.3358	<0.0001
1990-1994 ***	-2.0972	<0.0001
1995-1999 ***	-0.6770	<0.0001
Intercept	-0.4176	0.0620
Goodness of Fit Measures		
Log Likelihood Ratio (29 df)	Chi-Square = 3158.48	<0.0001
Pseudo R-Square = 0.4352		

*** ChiSq significant at .01 level for comparison between stayers and leavers in retention model

** ChiSq significant at .05 level

* ChiSq significant at .10 level

Goodness of fit measurements in the above table include Chi-squared and the pseudo R-squared measurements. The Chi-squared test evaluates the null hypothesis that all coefficients in the model equal zero. Chi-squared is calculated to be 3158.48 and the probability that all the coefficients in the model equal zero is less than 0.001. The pseudo R-squared measurement is calculated from the log likelihood measurement and indicates what percentage of the variance in the model is correctly explained. Pseudo R-squared equals 0.4352, therefore 43.52 percent of the variance in the model is correctly explained. The third measure of goodness of fit, shown in Table 12, is a classification table. The classification table was calculated at a cutoff of 0.63, which is the actual percentage of nurses who were retained. This table shows that 83.43 percent of the nurses were correctly classified. Sensitivity, which measures the percentage of nurses who stayed who were correctly classified, was 82.33 percent. Specificity, which measures the percentage of nurses who left who were correctly classified, was 85.31 percent. The rate of false positives was 14.69 percent. The rate of false negatives was 17.67 percent. Therefore, the Chi-squared test, pseudo R-squared measurement and the classification table results all conclude that the model is a good fit.

Table 12. Classification Table for Retention Model

	Percentages				
Probability Level	Correct	Sensitivity	Specificity	False Positive	False Negative
0.63	83.43	82.33	85.31	14.69	17.67

2. Interpretation and Evaluation of Parameter Estimates

The MALE variable is significant and positive. This indicates that males are more likely to stay in the NNC than females. This is what was hypothesized and indicates that childbirth and homemaking may play a significant role in whether a female nurse decides to stay active duty.

Married with children and single with children were also positively significant. This indicates that nurses with children are more likely to stay in, regardless of their marital status. This may be an indication that nurses with dependents stay in for job security and health benefits. An interesting finding was that married, no children does not differ significantly from single, no children. This indicates that marital status, in itself, may not be a contributing factor for nurses deciding to stay in the NNC.

The commissioning age and prior enlisted variables were positively significant. This indicates that the older a nurse is at commissioning, the more likely they are to retain. Plus, a prior enlisted person is also more likely to retain than a nurse who is not. The results of these two variables may demonstrate that people who are older are more likely to plan farther into the future and value retirement benefits more than a younger person. Plus, prior enlisted people are also more interested in retirement since they have a number of years in the military already and, therefore, they are more likely to retain as well.

Blacks and other minorities were found to be positively significant. This means that Blacks and other minorities are more likely to retain than Whites. This may be an indication of minorities, in general, experiencing greater equality in the military than they would experience in the civilian world. This may be due to efforts by the NNC and the military overall to maintain diversity throughout its ranks.

NROTC, HSCP, NCCP, Direct with bonus, and other gain categories were all negatively significant while MECP was positively significant. This means that nurses

who entered the Navy through MECP are more likely to retain than those who entered directly while those who entered any other way were less likely to retain. The MECP result may be another indication that prior enlisted people are more likely to retain simply because they have more time invested towards a military retirement. One interesting, although expected, result is that nurses who come into the Navy directly with a bonus are less likely to retain than those who do not receive a bonus. This suggests that the bonus may not be as effective as expected.

The postgraduate degree variable was positively significant meaning those who obtain degrees beyond a baccalaureate are more likely to stay active duty.

Interesting results were also revealed from the analysis of the big three hospitals, which the NNC states attendance of is highly recommended for promotion and retention. Both NH San Diego and NH Bethesda variables were not significant, meaning that there were no significant differences in retention between those who attended these two hospitals and those who did not. The only hospital that positively and significantly affected retention was NH Portsmouth. This may mean that, out of the big three hospitals, only NH Portsmouth may provide the promotion and retention opportunities the NNC is proposing.

All of the subspecialty groups except nurse anesthetists were positively significant. This indicates that a nurse who seeks extra training to specialize in almost any field beyond general nursing is more likely to retain. There was no significant difference between general nurse retention and nurse anesthetist retention. This may mean that civilian bonuses for nurse anesthetists is high enough to counter the job security and health benefits a CRNA may enjoy in the Navy.

All the year group variables were negatively significant. This means that any nurse from year group 1985 and beyond is less likely to stay active duty compared to their earlier peers. This correlates with the hypothesis that civilian nursing incentives and increasingly complex American conflicts both provide ample incentive for the Navy nurse to leave the military.

3. Partial Effects

As discussed previously, the probability of the notional person being retained was calculated in order to compare that probability against those whose explanatory variables change one by one. This is another way to visualize the significance of variables and what their impact is on the regression. The notional person is defined as female, single with no children, white, 27.3 years old at commissioning, not prior enlisted, a direct accession, holds a baccalaureate or less, never attended any of the big three hospitals, a general nurse and from a year group prior to 1985. The probability of the notional person being retained is 48.44 percent. The partial effects of all the variables that were significant in the regression plus the percent change in probability of retention are listed in Table 13.

Table 13. Partial Effects of Retention Regression

	Probability of Staying Active	Partial Effect	%Change in Probability
Base Case	48.44%		
Male ***	67.28%	0.1884	38.89%
Married With Children ***	62.25%	0.1381	28.51%
Single With Children ***	58.61%	0.1017	21.00%
Black ***	59.07%	0.1063	21.94%
Other ***	57.44%	0.09	18.58%
Age at Commissioning (28.3) *	48.77%	0.0033	0.68%
Prior Enlisted ***	79.23%	0.3079	63.56%
NROTC ***	28.77%	-0.1967	-40.61%
HSCP **	40.44%	-0.08	-16.52%
NCCP *	41.42%	-0.0702	-14.49%
MECP ***	70.71%	0.2227	45.97%
Direct with Bonus ***	35.93%	-0.1251	-25.83%
Other Gain Category ***	17.07%	-0.3137	-64.76%
Post Graduate Degree ***	94.19%	0.4575	94.45%
Did Attend NH Portsmouth ***	58.88%	0.1044	21.55%
Medical/Surgical ***	81.91%	0.3347	69.10%
Psychology *	61.85%	0.1341	27.68%
Emergency Room ***	75.13%	0.2669	55.10%
Operating Room ***	77.63%	0.2919	60.26%
Administration ***	87.09%	0.3865	79.79%
OB/Pediatrics ***	74.09%	0.2565	52.95%
Critical Care/ICU ***	57.11%	0.0867	17.90%
1985-1989 ***	8.33%	-0.4011	-82.80%
1990-1994 ***	10.35%	-0.3809	-78.63%
1995-1999 ***	32.32%	-0.1612	-33.28%

*** ChiSq significant at .01 level for comparison between stayers and leavers in retention model

** ChiSq significant at .05 level

* ChiSq significant at .10 level

Base Case: Female, Single No Children, White, 27.3 Years Old at Commissioning, Not Prior Enlisted, Direct Accession, Baccalaureate or Less, Did NOT Attend Big Three, General Nurse, Pre 1985 Year Group

If someone is similar to the notional person except that the nurse is male, the retention rate increases 18.84 percentage points. Another way of stating this is that the percent change in the probability of the male nurse being retained over the female nurse is 38.89 percent.

A person who is similar to the notional person except the nurse is married with children has a 13.81 percentage point increase in their retention rate. A person who is single with children has a 10.17 percentage point increase.

Blacks and other minorities experience a 10.63 and 9.00 percentage point increase in rate of retention, respectively, as compared to the White notional person.

If a nurse's commissioning age is increased by one year to 28.3 years, their retention rate increases only by 0.33 percentage points. Perhaps this variable is statistically significant, but it may not be numerically significant. A prior enlisted person, on the other hand, increases their rate of retention by 30.79 percentage points.

NROTC decreases retention rates by 19.67 percentage points. HSCP decreases retention rates by 8.00 percentage points. NCCP decreases retention rates by 7.02 percentage points. Direct accessions with bonuses decrease retention rates by 12.51 percentage points. Other gain categories experience a decrease in retention rates by 31.37 percentage points. MECP accessions are the only accessions that increase their retention rates, compared to the notional person, by 22.27 percentage points.

Those who have a postgraduate degree increase their retention rates by 45.75 percentage points. Those who attend NH Portsmouth increase their retention rates by 10.44 percentage points.

All of the subspecialty groups increase their retention rates as compared to the notional person save the nurse anesthetist subspecialty. These retention rate increases range from 13.41 percentage points for the psychology subspecialties to 38.65 percentage points for the administrators.

The year group variables, 1985 to 1989, 1990 to 1994 and 1995 to 1999, all decrease retention rates compared to the notional person by 40.11, 38.09 and 16.12 percentage points, respectively.

Overall, the three variables that have the largest positive change in retention rates are having a postgraduate degree, being a nurse administrator or being a medical/surgical nurse. The three variables that have the largest negative change in retention rates are being in year groups 1990 to 1994 or 1985 to 1989 or being assessed through an “other” gain category.

4. Potential Problems with Active Retention Model

Several problems can arise when running regression models. These include heteroskedasticity, functional form misspecification, and multicollinearity. Heteroskedasticity is avoided by using a logit regression. Functional form misspecification is not a problem when the variables are binary. Sample models were run with a commissioning age squared variable and it was found to not improve model fit significantly or change any variable signs or significance.

Finally, multicollinearity is encountered when several variables measure roughly the same thing. This can lead to large variance in the parameter estimate to possibly include reporting the opposite sign. A way to measure whether collinearity is a problem is by calculating Variance Inflation Factors, or VIFs. If the explanatory variable VIF is larger than the model VIF, calculated by: $1 \div (1 - R\text{-square}) = 1 \div (1 - 0.4450) = 1.80$, then multicollinearity may be an issue. Various ways to resolve multicollinearity include increasing sample size, removing variables or ignoring the problem. VIFs were calculated for the retention model and it was found that the following variables had a higher VIF than the model: Prior, NROTC, Direct with bonus, MECP, HSCP, and year groups 1990

to 1994 and 1995 to 1999. It is expected that these variables would have some degree of multicollinearity since the accession sources measure roughly the same thing as do the year groups.

C. RESERVE AFFILIATION MODEL

1. Logit Regression Model

The affiliation model contained 1,421 observations and 29 variables, only 11 of which are significant. Table 14 shows the parameter estimate and the level of significance for each variable, plus the goodness of fit measurements for the entire model. All levels of significance are shown as one-tailed tests, except the accession sources which are two-tailed tests.

Table 14. Logit Regression Results for Reserve Affiliation Model, N=1421

Variable	Parameter Estimate	Pr>ChiSq
Male	0.1773	0.1660
Married With Children	-0.0205	0.4525
Married No Children	-0.1555	0.1625
Single With Children	-0.0781	0.3760
Age at Commissioning **	0.0264	0.0390
Prior Enlisted ***	0.6739	0.0055
Black	-0.2007	0.2525
Other	0.2551	0.1085
NROTC	-0.3016	0.3420
HSCP	0.2555	0.3290
NCCP	-0.6198	0.1480
MECP	-0.6716	0.2940
Direct with Bonus	0.0739	0.7550
Other Gain Category ***	0.8608	0.0010
Post Graduate Degree	-0.1632	0.2670
Did Attend NH San Diego	0.1867	0.1100
Did Attend NH Portsmouth	0.0835	0.3155
Did Attend NH Bethesda	-0.2325	0.2480
Medical/Surgical	0.2545	0.1870
Psychology	0.3164	0.2340
Emergency Room ***	0.7297	0.0050
Operating Room ***	1.0965	<0.0001
Administration *	0.6908	0.0600
Nurse Anesthetist	0.2850	0.1990
OB/Pediatrics **	0.4224	0.0195
Critical Care/ICU ***	0.6568	<0.0001
1985-1990 ***	-0.8979	<0.0001
1990-1994 ***	-1.0197	0.0005

1995-1999 ***	-1.2214	<0.0001
Intercept	-1.2014	0.0050
Goodness of Fit Measures		
Log Likelihood Ratio (29 df)	Chi-Square = 160.08	<0.0001
Pseudo R-Square = 0.0936		

*** ChiSq significant at .01 level for comparison between affiliated and non-affiliated officers in reserve model

** ChiSq significant at .05 level

* ChiSq significant at .10 level

Goodness of fit measurements in the above table include the Chi-squared and the pseudo R-squared measurements. The Chi-squared value is 160.08 and the probability that all the coefficients in the model equal zero is less than 0.001. Pseudo R-squared equals 0.0936, therefore only 9.36 percent of the variance in the model is correctly explained. The third measure of goodness of fit, shown in Table 15, is a classification table. The classification table was calculated at a cutoff of 0.29, which is the actual percentage of nurses who affiliated with the reserves. This table shows that 66.85 percent of the nurses were correctly classified. Sensitivity, which measures the percentage of nurses who affiliated that were correctly classified, was 61.41 percent. Specificity, which measures the percentage of nurses who did not affiliate that were correctly classified, was 69.08 percent. The rate of false positives was 30.92 percent. The rate of false negatives was 38.59 percent. The Chi-squared test and classification results indicate that the model is somewhat useful, but the pseudo R-squared measurement indicates that this model does not have a very good fit.

Table 15. Classification Table for Reserve Affiliation Model

	Percentages				
Probability Level	Correct	Sensitivity	Specificity	False Positive	False Negative
0.29	66.85	61.41	69.08	30.92	38.59

2. Interpretation and Evaluation of Parameter Estimates

As was stated in the previous section, only 11 variables are significant in the affiliation model. This differs greatly from the retention model's 25 significant variables. All significant variables had similar signs as in the retention model except for other gain

category. The retention model found this variable to have a negative effect on retention as compared to direct accession while the affiliation model found it to have a positive effect. Similar to the presentation of the active duty retention model, we defer the discussion of coefficient magnitude until the next sub section when we discuss partial effects.

The MALE variable is not significant which means there is no difference in affiliation between men and women. Likewise, all the marital/dependent status variables are not significant. This means there is no significant difference between being single with no children and all the other categories.

Commissioning age and prior enlistment are both positively significant. This indicates that the older a nurse is at commissioning, the more likely they are to affiliate. Plus, a prior enlisted person is also more likely to affiliate than a nurse who is not. The results of these two variables may demonstrate, again, that people who are older are more likely to plan farther into the future and value retirement benefits more than a younger person. Plus, prior enlisted people are also more interested in retirement since they have a number of years in the military already and, therefore, they are more likely to affiliate as well. Overall, these people may leave active service and continue on with the reserves in order to accrue retirement benefits in the long run.

The minority variables are not significant, which means there is no significant difference in affiliation behaviors between minorities and non-minorities.

The only accession source that is significant is the other gain categories variable, which is positive. This means that people who enter the NNC through other gain categories are more likely to affiliate with the reserves than direct accessions. What is also of interest is that the MECP variable is not significant in this model like it is in the retention model. It was expected that if the commissioning age and prior enlisted variables were significant, MECP would also be significant.

The postgraduate degree variable and the big three hospital variables were not significant. This means there is no difference in affiliation behavior between those who pursue more schooling and those who do not. Plus, there is no difference in affiliation behavior between those who attend any of the big three hospitals and those who do not.

Only five of the subspecialty groups were significant and they were all positive. These groups included emergency room nurses, operating room nurses, administrators, obstetrics/pediatric nurses and critical care/intensive care unit nurses. These results mean that these subspecialty groups are more likely to affiliate with the reserves than general nurses. This may suggest that the nurses who seek extra training and certification have spent more time in the military and are more interested in seeking retirement benefits through the reserves.

All the year group variables were negatively significant. This means that any nurse from year group 1985 and beyond is less likely to affiliate with the reserves compared to their earlier peers. This correlates with the hypothesis that civilian nursing incentives and more and more American conflicts provide ample incentive for the Navy nurse to leave the military entirely and not affiliate with the reserves.

3. Partial Effects

As discussed previously, the probability of the notional person affiliating was calculated in order to compare that probability against those whose explanatory variables change one by one. The notional person is defined as female, single with no children, white, 27.3 years old at commissioning, not prior enlisted, a direct accession, holds a baccalaureate or less, never attended any of the big three hospitals, a general nurse and from a year group prior to 1985. The probability of the notional person affiliating with the Reserves is 38.23 percent. The partial effects of all the variables that were significant in the regression plus the percent change in probability of affiliation are listed in Table 16.

Table 16. Partial Effects of Reserve Affiliation Regression

	Probability of Reserve Affiliation	Partial Effect	%Change in Probability
Base Case	38.23%		
Age at Commissioning (28.3) **	38.85%	0.0062	1.62%
Prior Enlisted ***	54.84%	0.1661	43.45%
Other Gain Category ***	59.41%	0.2118	55.40%
Emergency Room ***	56.21%	0.1798	47.03%
Operating Room ***	64.94%	0.2671	69.87%
Administration *	55.25%	0.1702	44.52%
OB/Pediatrics **	48.56%	0.1033	27.02%

Critical Care/ICU ***	54.41%	0.1618	42.32%
1985-1990 ***	20.14%	-0.1809	-47.32%
1990-1994 ***	18.25%	-0.1998	-52.26%
1995-1999 ***	15.43%	-0.228	-59.64%

*** ChiSq significant at .01 level for comparison between affiliated anon-affiliated officers in reserve model

** ChiSq significant at .05 level

* ChiSq significant at .10 level

Base Case: Female, Single No Children, White, 27.3 Years Old at Commissioning, Not Prior Enlisted, Direct Accession, Baccalaureate or Less, Did NOT Attend Big Three, General Nurse, Pre 1985 Year Group

If someone is similar to the notional person except that their commissioning age is 28.3 vice 27.3, their affiliation rate increases by 0.62 percentage points. While this may be statistically significant, it is not numerically significant. A prior enlisted person increases their affiliation rate by 16.61 percentage points.

A nurse who is the notional person except that they entered through some other gain category increases their affiliation rate by 21.18 percentage points.

Emergency room nurses, administrators and critical care/ICU nurses all increase their affiliation rates by about 17 percentage points. Operating room nurses increase their affiliation rates by 26.71 percentage points and obstetric/pediatric nurses increase their affiliation rates by 10.33 percentage points.

The year group variables, 1985 to 1989, 1990 to 1994 and 1995 to 1999, all decrease retention rates compared to the notional person by 18.09, 19.98 and 22.80 percentage points, respectively.

Overall, the three variables that have the largest positive percentage change in affiliation rates are operating and emergency room nurses and those who enter the NNC through other gain categories. The three variables that have the largest negative percentage change in retention rates are being in any of the year groups after 1984.

4. Potential Problems with Reserve Affiliation Model

In order to avoid functional form misspecification in the affiliation model, sample models were run with a commissioning age squared variable. It was, again, found to not improve model fit significantly or change any variable signs or significance.

The model VIF for the affiliation model was 1.128. Almost all of the explanatory variables had a larger VIF than the model. This means that the model does not produce very useful results and is probably due to the low number of observations and the especially low number of people who actually affiliated with the reserves.

D. SUMMARY

The regression model for retention was a good fit. The significant characteristics that increase retention rates include being male, married with children or single with children, older at commissioning, prior enlisted, a minority, entering active duty through MECP, holding a postgraduate degree, attending NH Portsmouth and being in any of the subspecialty groups except nurse anesthetists, as compared to the base cases. The significant characteristics that decrease retention behavior include entering the Navy through any other program besides MECP and being in a year group later than 1984, as compared to the base cases.

The affiliation model, on the other hand, did not produce as good a fit as the retention model but still may be useful. There were many more multicollinearity problems encountered and not as many significant results. The significant characteristics that increased affiliation rates were being older at commissioning, prior enlisted, entering the Navy through some other gain category, being an operating room nurse, an emergency room nurse, an administrator, an obstetric/pediatric nurse, or a critical care/intensive care unit nurse, as compared to the base cases. The significant characteristics that decrease affiliation behavior include being in a year group later than 1984, as compared to the base cases.

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VII. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

Currently, the NNC is at its lowest end strength in the past 13 years.¹¹⁷ The number of nurses in the Nurse Corps has dropped so dramatically that efforts put toward recruiting and retaining general nurses is no longer enough to cover the specific skill sets required in the Navy. In the past 3 years, the Nurse Corps has not been able to fill their billets authorized.

In this thesis, we explore the issue of retention rates in the Navy Nurse Corps in two approaches: (1) an organizational analysis of the Navy Nurse Corps utilizing the Organizational System Framework and the Organizational Configurations model; (2) an empirical analysis to analyze characteristics of those who are retained in the active Naval Nurse Corps and those who affiliate with the reserve Naval Nurse Corps using multivariate logit regressions

The findings from this study validate aspects of prior studies describing why nurses in the Naval Nurse Corps (NNC) tend to stay (retain) or leave (attrite) the Navy, i.e., negative and positive retention factors.

Primary Conclusion:

The top three factors that positively increase active retention rates in the NNC are having a post graduate degree, holding a medical/surgical subspecialty, or holding an administration subspecialty.

The common factor among these three variables appears to be that these NNC officers attained proficiencies beyond that of a general nurse. NNC officers who have gained proficiency through post graduate education or certification/subspecialty in a specific field may have more vested time in the military towards retirement or they may see more opportunity in their career field working within the NNC than leaving for a civilian health care position.

¹¹⁷ G. Zangaros, *Data Analysis of Retention Factors*.
<https://wwwa.nko.navy.mil/portal/page?paId=page11924> (Accessed Dec 2005).

Additional Conclusions:

The two accession sources with the greatest positive effect on active NNC retention were the Medical Enlisted Commissioning Program (MECP) and Direct accessions. Surprisingly, nurses who came into the NNC directly with a bonus were more likely to leave the Navy than those without the bonus. Overall, these findings mirror previous research.^{118,119} However, there is a notable concern with simply increasing the number of MECP candidates. A substantial increase may translate into a smaller pool of officers available to fill the more senior ranks of O5 and O6, since most MECP candidates have the option to retire at the O3 to O4 level.

Male nurses retain at a significantly higher rate than female nurses. The percentage of male NNC officers has increased over the past decade which has an additional positive benefit of increasing gender diversity within the NNC.

Nurses who have children – single or married – retain at a significantly higher rate than nurses without children. Having children increases retention rates, but can be seen by some as costly due to the dependent pay scales and health care costs.

Black nurses and other minority nurses retain at a significantly higher rate than White nurses. The percentage of Blacks and other minorities in the NNC has increased over the past 20 years, having the added positive benefit of increasing NNC diversity. These findings highlight the substantial progress the NNC has made towards diversifying. Continued and enhanced recruitment of additional minorities appears to hold substantial promise both in terms of improving retention and the Navy continuing to be highly reflective of American society.

Nurses who attend Naval Hospital Portsmouth retain at a significantly higher rate than those nurses who do not attend this hospital. However, it is interesting to point out that there were no significant differences in retention rates for Naval Hospitals Bethesda or San Diego. An assignment to one of the three major medical facilities has

¹¹⁸T. Maeder, “The Costs and Benefits of the Navy Nurse Corps Accession Sources,” (Monterey, California: Naval Postgraduate School, December 1999).

¹¹⁹ D. Kinstler and R. Johnson, “Developing a Markov Model to be Used as a Force Shaping Tool for the Navy Nurse Corps,” (Monterey, California: Naval Postgraduate School, March 2005).

generally been acknowledged to be a prerequisite for promotion and it appears that only NH Portsmouth positively increases retention.

In general, nurses earning a subspecialty beyond general nurse and nurses who have a postgraduate degree retain at a significantly higher rate. Both findings may reflect the logic that because a nurse has dedicated the additional time and energy involved to earn a subspecialty, and/or complete graduate education while on active duty, the nurse is closer to career length service (retirement), and/or is more “vested” in the institution.

The reserve model assessing the affiliation with the reserve NNC was inconclusive due to the low number of variables that were significant. However, the model was able to generate some significant characteristics of those who do and do not affiliate with the reserves. **Those more likely to affiliate have prior service and a subspecialty code beyond general nurse.** Again, the affiliating nurse will have served enough active duty time through prior service or additional education that the value of a military retirement increases enough to convince them to affiliate.

The results of the year group variables in both models demonstrate that as time goes on fewer people are likely to stay active duty or affiliate with the reserves. This correlates with the increase in operational tempo experienced by both the active and reserve NNC and the increase in the civilian to military pay gap.

B. RECOMMENDATIONS

The NNC is in a time period where the number of inputs it must attempt to deal with is continually expanding, retention rates are decreasing and recruiting is harder due to a nationwide shortage of nurses.

1. Recommendations for the Department of the Navy

- Increase the recruitment of minorities into the NNC.
- Continue providing additional pay and benefits for nurses with dependents.
- Continue offering tuition assistance to nurses.

2. Recommendations for the Navy Nurse Corps

- Shift focus from accession bonuses to retention bonuses.

- Offer a retention bonus for those who acquire a subspecialty code beyond general nursing, especially those subspecialties that are critically undermanned.
- Increase the number of accessions through MECP and combine this with an incentive package or retention bonus to entice these nurses to stay beyond twenty years of active service.
- Offer and support opportunities for advanced degrees and continuing education through tuition assistance, bonuses or sabbaticals.
- Enhance the mentor program.
- Continue supporting the NNC NKO web site while ensuring that messages read on the site are consistent with what is being demonstrated in commands and on boards.
- Continue to promote esprit de corps within nursing commands. This is vital to creating a sense of unity and loyalty among nurses.

3. Long Term Recommendations

- Offer sabbaticals to allow a NNC officer to leave active duty and then re-enter in the future at their previous rank and rotation, with no negative impact on their promotion status due to break in service. This break in service may be used to gain a postgraduate degree or allow time to have a family, both of which increase retention.
- Offer overall retention bonuses utilizing auction theory. Auction theory would allow NNC officers to bid for a retention bonus. The number of nurses needed to fill all subspecialty billets would be calculated and then that number of nurses with the lowest bids would be paid to stay in the Navy.

C. FURTHER RESEARCH

The NNC is presently working on converting some NNC billets to government service (GS) or contract nurses. Future research should survey the workload impact that has shifted after the conversion of billets. A civilian or GS nurse is hired to do nursing, not the collateral duties that must be maintained by the NNC officer.

Recent and past studies have assessed the military to civilian pay gap but this gap is increasing due to the predicted chronic nursing shortage. Civilian nursing wages and accession bonuses are soaring to levels that were never anticipated. An updated review of the civilian to military pay gap that includes these bonuses should be made.

Another factor that should be taken into account is the impact of operational commitments. It is hypothesized that the increased number of deployment over the past decade for active and reserve units is negatively impacting retention and affiliation.

A better study of the military to civilian pay gap combined with operational tempo data may explain significance of the year group dummy variables more completely.

There are various studies being developed utilizing auction theory as a tool to retain military officers. Every NNC officer has a different opportunity cost for staying either active duty or reserve with the NNC. These opportunity costs should be evaluated to assess the least expensive way to retain nurses.

A follow-on study of the reserve affiliation model should be conducted due to the low number of significant variables and low number of people included who actually affiliated with the reserves. This follow-on study should increase the number of observations and, hopefully, increase the number of affiliates to better assess characteristics of those who do and do not affiliate with the reserves.

Overall, the pool of nurses available to the NNC for the next twenty years has already been created. The NNC will have to compete with civilian hospitals, decreasing nursing instructors and retiring nurses to recruit and retain the nurses it needs for the future. It is imperative that the NNC strive to predict their future challenges so they can plan for change and, thereby, realize the most effectiveness and efficiency from their organization.

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